The DECconnect Communications System Handbook
The Integrated Communications Solution

digital

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▪ What Is DECconnect?

DECconnect is the information network for your office.

Your office environment demands communications access. You need to continually build a computing environment that solves specific problems. One that is cost-effective today but will not be obsolete tomorrow.

Each year this environment becomes more complex as the number of terminals and personal computers in the office increases. And each user needs to share documents, resources, and data. Along with this proliferation of terminals and personal computers, numerous departmental computer systems are being installed for solving particular problems at various locations. For optimum benefits, all these components—terminals, PCs, departmental computers, and large systems—must work together and share information.

The DECconnect Communications System represents the latest evolution in Digital's ongoing commitment to produce networking products that fulfill all your communications requirements and more. DECconnect communications includes the full family of Digital products from network electronics to cabling and connections. DECconnect answers your need for access to corporate computer networks, your need for telephone communications and your need for access to a video network.

DECconnect provides a simple, elegant, and cost-effective cabling system that brings both high-performance Ethernet* and enhanced terminal interconnection to offices and work areas. Through specialized office wiring radiating from a faceplate to a centralized equipment area called the Satellite Equipment Room, DECconnect cabling allows you to connect terminals, PCs, and workstations to each other. And with standard Ethernet as a backbone, you have access to the datacenter and large mainframe resources throughout your company.

Multiple technologies, one cabling system. DECconnect integrates four separate communications technologies into one cohesive networking solution.

- High-speed local area network (LAN) at 10-Mbits-per-second ThinWire Ethernet communications for PCs, workstations, and departmental systems.
- Unshielded twisted-pair terminal communications (up to 19.2-Kbits-per-second).
- Voice connection for telephone systems.
- Video connection for video applications.

* Unless otherwise indicated, all references to Ethernet are to baseband Ethernet.

These multiple technologies handle your communications needs today and allow you room for growth and the expanded capabilities you will need in the future.

▪ Why DECconnect?

Whether you are reconfiguring your present network by adding new communications equipment or planning a new facility, you face serious cabling decisions. Office cabling has increased in complexity as a result of customer-owned PBXs, local area networks, and a general increase in the amount of data communication. And cable installation is expensive. The wiring systems you install today should serve your communications needs for many years to come.

DECconnect cabling—Digital's way of integrating all communications networks in a facility—is your answer.

DECconnect cabling is implemented through a radial wiring topology. As a central communications hub, the Satellite Equipment Room (SER) houses the active communications components. From the SER, communications cables radiate to the DECconnect faceplate in each office in the area. Separate cables are used for each of the four communications technologies—allowing you to implement technological enhancements as they occur without disrupting your system.

Meets Your Communication Needs for Today and Tomorrow

Full communications availability in every office. The network integration is most apparent at the DECconnect faceplate, which provides plug-in connections for all four communications technologies described above: high-speed Ethernet LAN communications, terminal communications, voice, and video. Each technology is immediately available to every user. Your users can plug their terminal, personal computer, workstation, or departmental system into the DECconnect faceplate as easily as they would plug in or move their telephone. No matter what application or equipment your users have—whether it's a terminal, a workstation, or a full computer system—they'll be able to plug into the network and be more productive right from the start. If their requirements change or they upgrade their system, you can still be confident that the appropriate communications facility will be available to them through the DECconnect faceplate in their office.

High-speed LAN communication from the desk to the datacenter. ThinWire Ethernet, DECconnect's high-speed data communication cable, is flexible and inexpensive. Completely compatible with Digital's standard Ethernet products, it revolutionizes office computing. With ThinWire Ethernet you can instantly transfer vast amounts of data, such as whole software programs. Enhancing communication between your desk and the datacenter, ThinWire Ethernet increases the productivity of your company's most valuable resource—its people.

Offers Unprecedented Flexibility

Flexible configurations. The DECconnect system is based on a simple design that lends itself to flexible networking solutions. It accommodates virtually all office layouts and working patterns, and both simple and complex networking configurations.

User and equipment mobility. When members of your organization move from one section of your network to another, they unplug their terminals or computers from one faceplate and reconnect them to another. They will find themselves within the same familiar environment, using the same communications resources.

Easy expansion. If your company adds a new cluster of offices, you simply add a new Satellite Equipment Room, new cabling, and new faceplates to the existing network with no downtime and no disruption of existing services. With this kind of flexibility, the DECconnect system can easily accommodate future growth in your department or business.

Ease of installation and maintenance. Installation is easy. You can pull all the communications cables you need at the same time. And because all DECconnect's active components are centralized in Satellite Equipment Rooms, they are as easy to reach as they are to maintain.

Convenient Ordering with Standard Network Packages

To take the complexity out of ordering network products, you can use Digital's new Standard Network Packages. Digital's industry-unique approach to packaging of network products provides a simple means to attain complete network solutions. The packages make it easy to order DECconnect for your company's offices and facilities.

With Standard Network Packages you can take a building-block approach to networking. Your selection includes a low-speed terminal package, a high-speed PC/workstation package, a floor package, a building package, a computer room package, a DECnet/SNA Gateway package, and a Wide Area Gateway package. Choose the appropriate package, or set of packages, that satisfy your communications needs. Digital then delivers the hardware, software, and services to bring your network up and keep it running.

▪ Why Digital?

Networking leadership. Digital Equipment Corporation pioneered distributed processing over 25 years ago when we made computers accessible to individual users. Today—while other vendors have yet to deliver their first installations—Digital is at the forefront of networking leadership, with enhanced second-generation networking products that link users into effective teams and organizations.

Distributed processing. Digital's networks put your resources where you want them. Your terminals, desktop devices, and computers can be placed in the office, in the research laboratory, or the data center. Dedicated smaller computers and workstations in a network have access to the powerful capabilities of larger systems. Individual users may have access to applications, data, CPUs, mass storage, printers, plotters, and other users—a full spectrum of computing resources.

Compatible systems. Digital's distributed networking is set within a reliable architecture that offers compatibility between systems. You get the power and range of VAX systems. Reliable applications based on the single VMS operating system. The DECnet family of networking products such as DECnet-VAX, DECnet-RSX, DECnet-DOS, and DECnet-ULTRIX. And the best possible technology—Ethernet—for local area nework transmission.

Adherence to standards. By adhering to the International Standards Organization's Open System Interconnect (OSI) standard and the IEEE 802.3 standard, Digital can integrate other vendors' systems and networks to further expand your networking possibilities. As a Digital customer you have the assurance that your investment is protected. You can network the systems you are now using, as well as those you may select in the future.

Flexibility for growth. The flexibility associated with Digital's networks makes growth easy. Your network can begin small, to serve an office, a floor, or a building. It can expand when necessary in a modular, cost-effective fashion to include many facilities. With Ethernet bridges to connect buildings and Digital's gateways to connect continents, your expansion potential is nearly limitless.

Investment protection. Today, Digital has installed over 50,000 Ethernet connections for over half a million users worldwide—making us the leading supplier of networked computer systems. There is no better protection for your investment than the experience of your vendor.

The DECconnect Communications System reinforces Digital's reputation for quality, leadership, and value. You are investing in the knowledge, expertise, and experience that's behind the devices, the cables, the packages, and the service contracts. These less tangible components are essential in protecting your investment and ensuring that your communication solutions are met.

▪ What's In This Handbook

This handbook describes the individual products, packages, and services that make up the DECconnect Communications System. It's designed for those individuals who are planning their organization's long-range networking capabilities and strategies.

For your convenience there is a chapter each on how to configure the DECconnect cabling system in your office, floor, building, and extended networks. Configuration and design guidelines are given in Appendices A and B. Standard Network Packages that simplify your network planning, installation, and maintenance choices are discussed separately. So are network services that support the implementation of the DECconnect Communications System—from network design to network maintenance.

This handbook is an overview that should help you decide on a network strategy based on Digital's DECconnect System.

The DECconnect Communications System supports data, voice, and video communication—all within an integrated network environment. Integration starts in the office, where most communication needs begin. Whether it's an isolated office within the corporation's manufacturing floor or one in a large cluster of sales offices, the communication needs are similar. The office is the place you use your PC/workstation or terminal to read and respond to electronic mail, access the data and information you need for your tasks, produce the reports and messages needed to transact your business, and carry on your telephone conversations.

In today's corporate world, chances are that this office may not be yours indefinitely. Employees or departments may be moved on short notice to a different location, to another floor, or another building. How easy is it for your company to move equipment? To plug into a new area with the assurance that you will not lose valuable worktime? Are you sure that your company will not need to invest in new equipment, or be faced with extensive installation and cabling costs?

The DECconnect Communications System is designed for these eventualities. Ideally, every office in your corporation will be equipped with a DECconnect faceplate. So that your communication needs—present or future—will be met.

▪ The DECconnect Faceplate

The DECconnect Faceplate allows a single point of contact between users and all the communications networks in a facility. The faceplate's four plug-in receptacles provide the physical connections for a ThinWire Ethernet cable, unshielded twisted-pair data cable, telephone cable, and video cable. In turn, these cables connect to data, voice, and video communication networks.

With the wires in place, equipment can be as readily connected as disengaged, or swapped from one location to another. And you can connect what office communication equipment you need—when you need it.

There are two versions of the faceplate. One is mounted on a standard electrical box for standard wall construction; the other, on a special surface-mount wall box for modular offices. Each has four ports for connecting devices to your various communication networks. Illustrated in Figure 2.1, these are:

- A ThinWire Ethernet BNC connector for connecting PC/workstations to ThinWire Ethernet cable.
- A modified modular jack (MMJ) for connecting terminals and printers to twisted-pair data communication cable.

- A modular jack (MJ) for connecting telephone equipment to a voice communication network. The MJ can be adapted to equipment from any telephone vendor.
- An F-Connector for connecting video equipment to a Community Antenna Television (CATV) network.

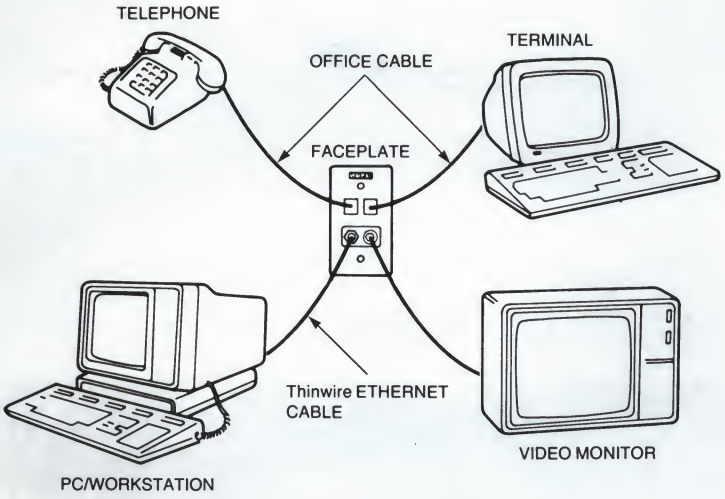


Figure 2-1 ▪ Faceplate Connections

▪ Simplified Connections

Connecting your PCs, workstations, terminals, and printers to the DECconnect Communications System is simplified with the use of jacks, connectors, and adapters.

Telephone connections. Modular snap-in jacks are available to accommodate various PBX telephone communication vendors.

PC/Workstation connections. The ThinWire Ethernet Station Adapter (DESTA) connects a single office Ethernet Station to ThinWire cabling for 10 Mbps LAN transmission. A compact, inexpensive Ethernet/IEEE 802.3

transceiver, the DESTA connects an Ethernet station either to a PC/workstation or departmental computing system with a standard Ethernet controller—DEUNA, DELUA, DEQNA, DECNA—(Figure 2.2). It allows UNIBUS, Q-bus, and PRO devices to connect to ThinWire Ethernet cable.

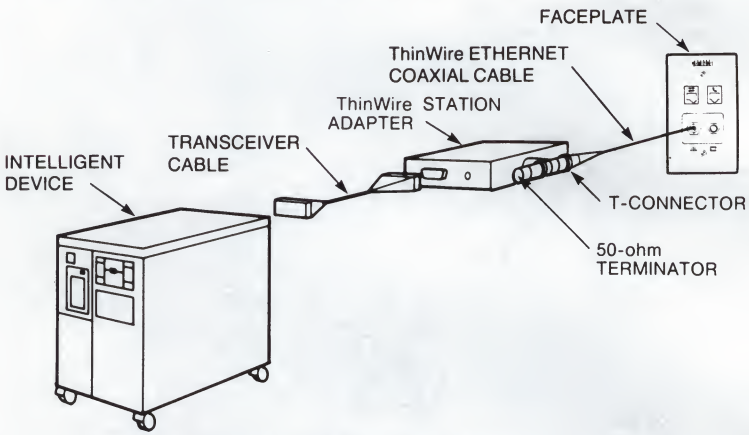


Figure 2-2 ▪ PC/Workstation Adapters

PC/Workstation Adapter with Surface-mount Faceplate

Terminal connections. Passive adapters, one for 25-pin terminals and another for a 9-pin connector for printers, adapt the present generation of low-speed transmission devices to the faceplate (Figure 2.3).

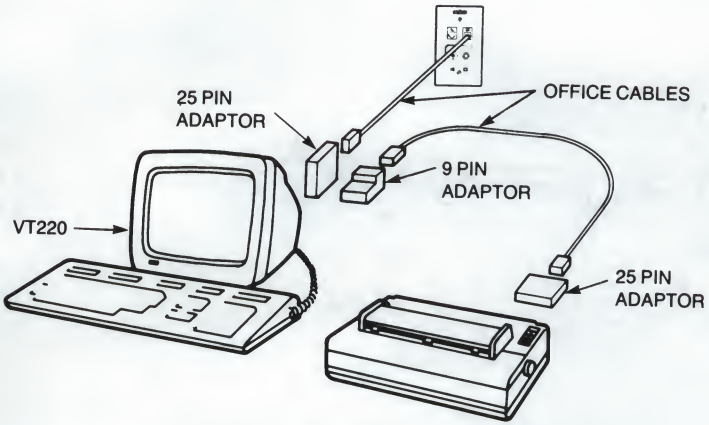
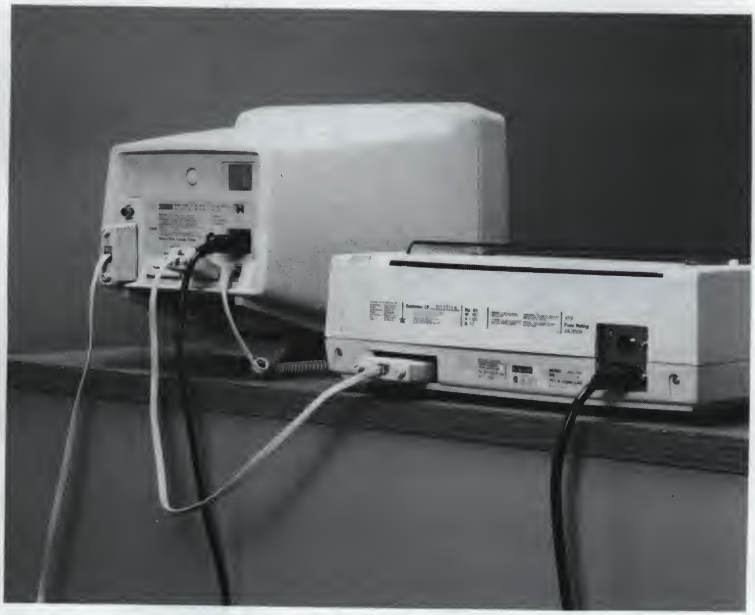


Figure 2-3 ▪ Terminal/Printer Adapters



Terminal/Printer Adapters

DEC423 Active Converter. The DEC423 active converter (Figure 2.4) is based on the RS423 standard. It allows you to run your terminals at higher speeds over longer distances than is possible with the RS232 standard frequently used for terminal communications. When you are converting to

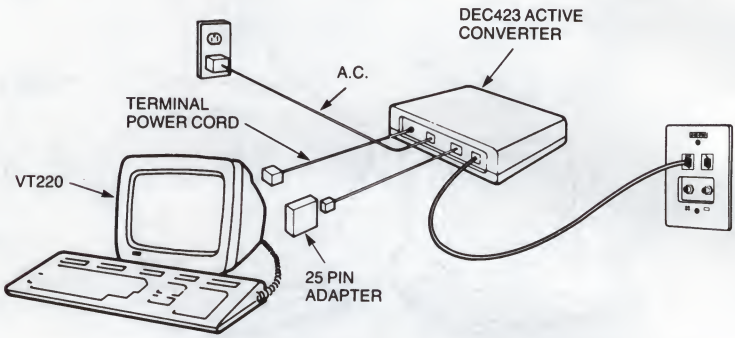
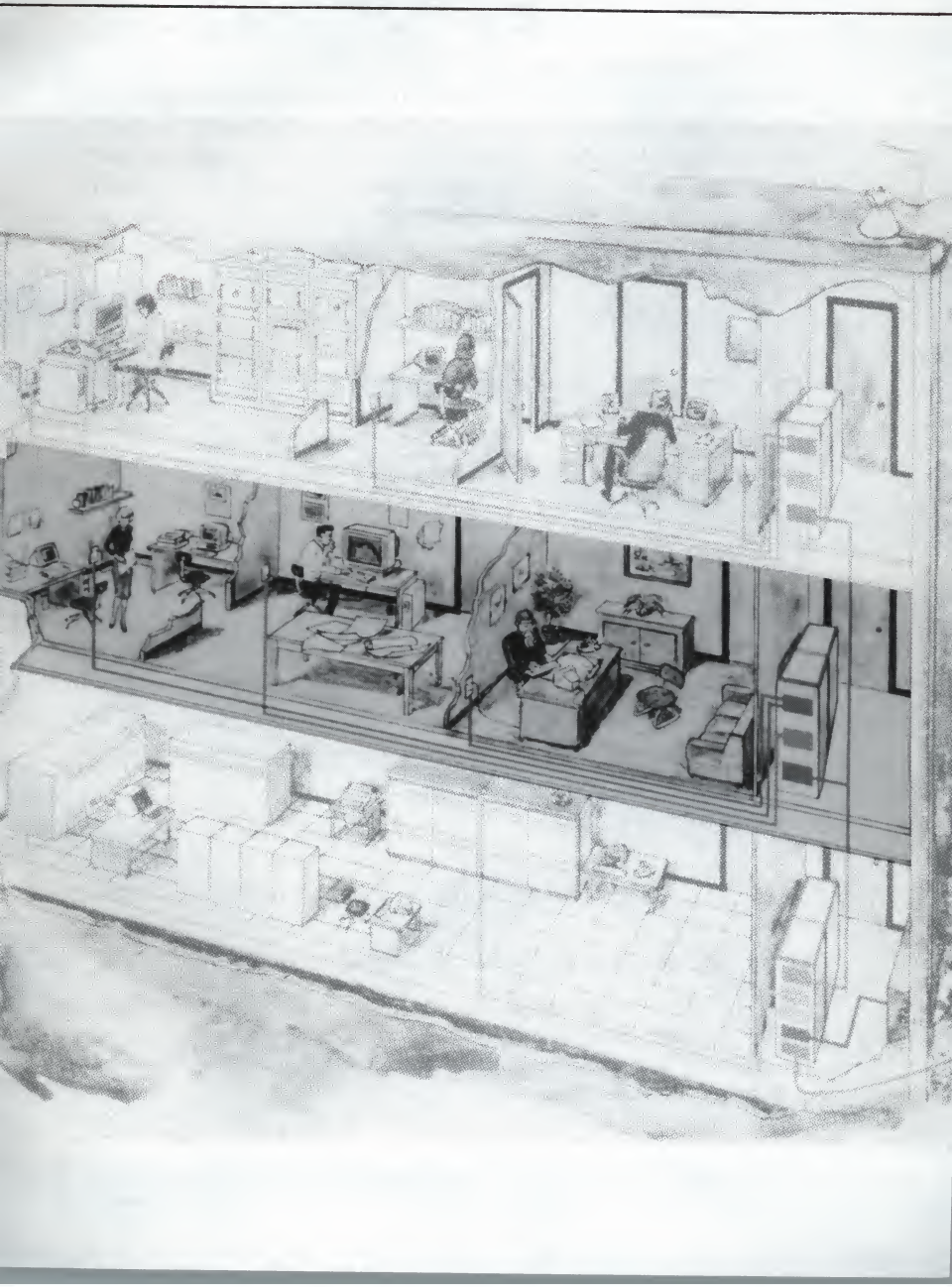


Figure 2-4 ▪ DEC423: Terminal/Printer Active Converter

DEC423: Terminal/Printer Active Converter

DEC423 signaling, you get increased configuration flexibility with cable runs of up to 1000 feet (versus RS232's 250 feet) from the terminal server in the Satellite Equipment Room to the office terminals.

The DEC423 converter gives improved reliability and availability. It provides enhanced electrical overstress (EOS) and electrostatic discharge (ESD) to protect and to reduce the occurrence of computer equipment damage that can result from static discharge, lightning, or ac power impulses.



DECconnect cabling links clusters of offices on a floor using a radial configuration. In a radial configuration, individual communication cables lead through ceilings or floors in an uninterrupted cable run from each office. The central location in which they meet is called the Satellite Equipment Room (SER).

The advantage of this system is that each office receives a dedicated set of communication cables. All communication cables are installed together, reducing the need for future installation costs. And the system is easy to maintain and reconfigure because cables and network communication equipment have two termination points—the faceplate and the Satellite Equipment Room, both easily accessible.

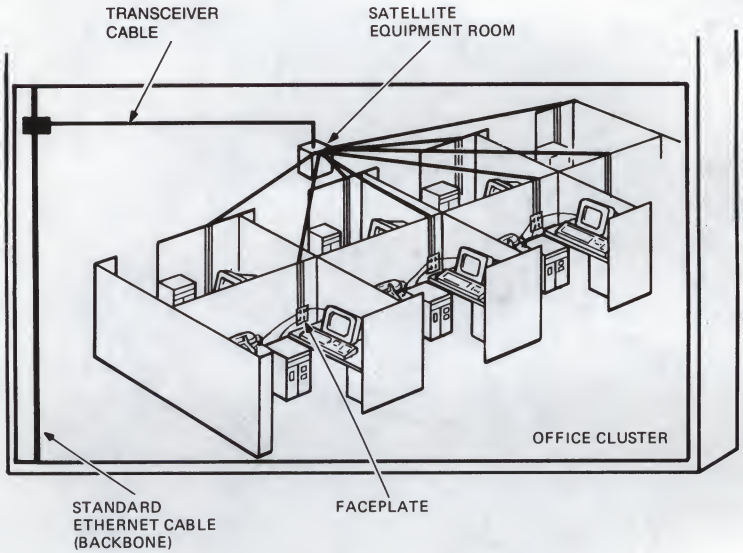
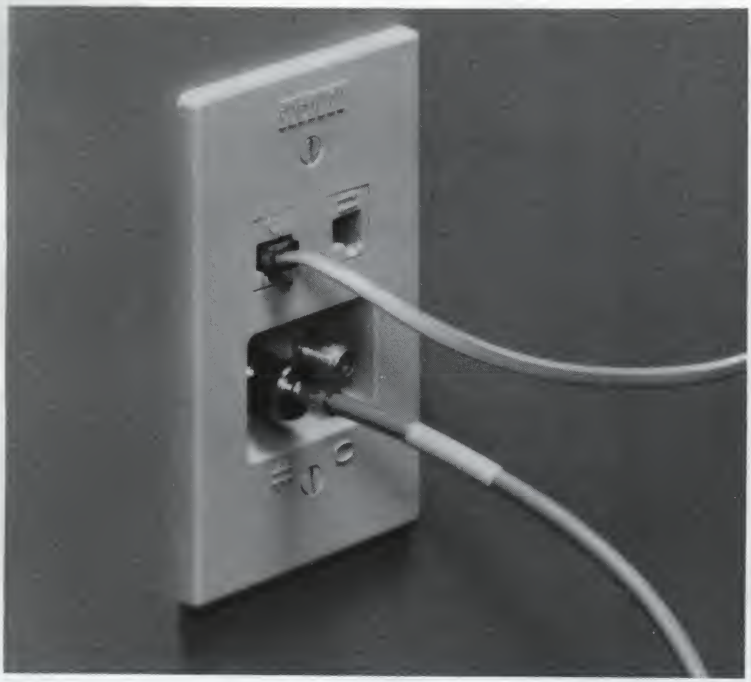


Figure 3-1 ▪ Radial Office Cabling Configuration

▪ From the Faceplate to the Satellite Equipment Room

Leading from the faceplate located in each office to the Satellite Equipment Room are the following cables: ThinWire Ethernet cable, unshielded twisted-pair cable for terminal connections, and telephone unshielded twisted-pair cable for voice communication.



Faceplate with Communication Cables

ThinWire Ethernet Cable

High-speed and inexpensive data communications. ThinWire Ethernet is a simple, inexpensive way to connect PCs and workstations. It delivers high-speed, 10 Mbit-per-second LAN performance and full Ethernet functionality to the work area. An enhancement to standard Ethernet, ThinWire Ethernet meets all IEEE 802.3 specifications, making it completely compatible with Digital's current family of Ethernet products.

Flexibility for office environments. As you would expect, ThinWire cable is thinner and more flexible than standard Ethernet coaxial cable. This makes it very suitable for office area installations in which cables run over office walls and through cable raceways attached to office partitions. This configuration flexibility allows as many as 28 stations to be serially linked. (See Appendix A for further information on serially linked stations.)

Simple installation. ThinWire networks are also less expensive and easier to install than standard coaxial cable networks. The thin, flexible cable can be installed in a radial topology along with the terminal, voice, and video cables from the Satellite Equipment Room to the office faceplate. Once in the office, connection is via plug-in T-connectors. No cable drilling is required.

Your choice of insulation and length. ThinWire Ethernet cable runs from the Satellite Equipment Room to the DECconnect faceplate in the office, and from the faceplate to the Ethernet equipment in the office. Like standard Ethernet cable, ThinWire cable is available with PVC or Teflon insulation, in selected lengths, or in 1,000 meter unterminated spools.

Unshielded Twisted-pair Cable for Terminal Communication

Traditional unshielded twisted-pair cable runs between the faceplate and a Satellite Equipment Room to connect terminals and printers to the network. Standard 8-conductor, 4-unshielded twisted-pair cable is recommended for this purpose. DEC423 6-conductor flat cable with MMJs is used to connect terminals and printers to the faceplate.

Telephone and Video Cables for Voice and Video Communications

The telephone cable is a standard 8-conductor, 4-unshielded twisted-pair cable. In the Satellite Equipment Room, the telephone cables connect to telephone network equipment. The video cable is standard CATV cable. It connects the devices on the faceplate's F-connector to a video network.

▪ The Satellite Equipment Room (SER)

Satellite Equipment Room

The Satellite Equipment Room (SER) is the hub of a radial configuration. Each floor may be configured with multiple SERs, each designed to serve a cluster of 64 offices or work areas.

SERs, which can measure five by eight feet, house the various communication devices that connect ThinWire Ethernet and unshielded twisted-pair cable to a standard Ethernet network. The SER may also house the various patching equipment that connects voice and video cables to their respective networks. For guidelines on SER design refer to Appendix B.

The average SER is designed to support 64 offices or locations with a high speed and terminal active port in each. These ports will be activated depending on your specific floor configuration.

▪ Equipment in the SER

The following communication devices may be located in the SER (Figure 3.2).

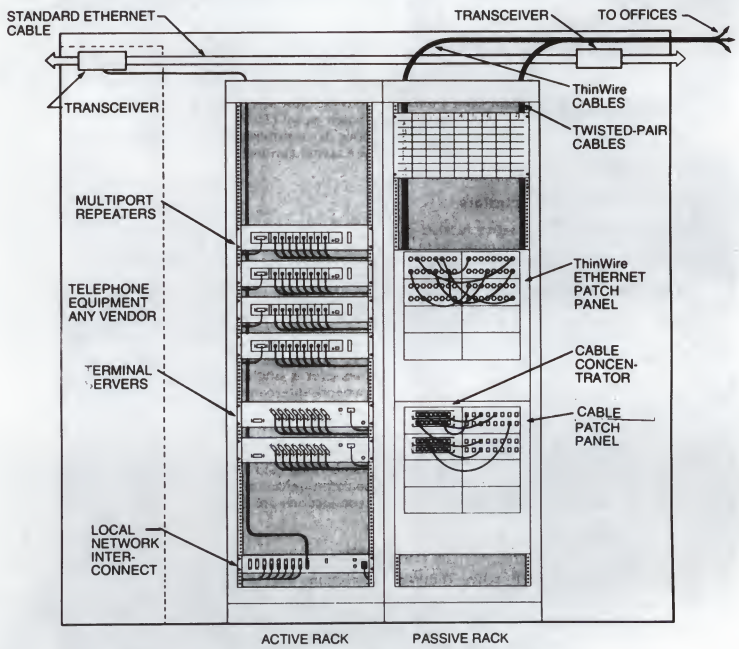


Figure 3-2 ▪ Typical SER Configuration

The Cable Patch Panel

Unshielded twisted-pair cables that lead into the SER are permanently terminated at the back of a cable patch panel (CPP). Those unshielded twisted-pair cables that require active network connections are patched through to cable concentrators. The CPP allows quick reconfiguration of unshielded twisted-pair connections.

Cable Concentrators

From a Cable Patch Panel, active unshielded twisted-pair connections lead to cable concentrators. Up to eight active connections lead to one cable concentrator. These connections are then "concentrated" into a single 36-pin connector that connects the cable to a terminal server. Refer to Figure 3.3.

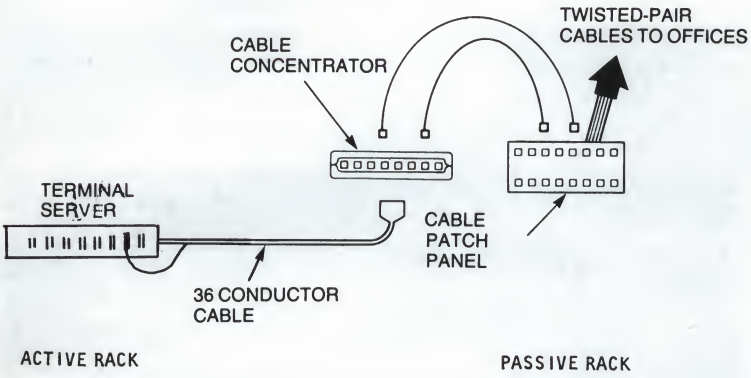


Figure 3-3 ▪ SER Terminal Cabling

The Terminal Server

From a cable concentrator, an 18-pair cable leads to a terminal server, an intelligent desktop-size unit that links asynchronous devices. The multiple terminal lines in the cable are patched to a single terminal server that multiplexes these lines over a single Ethernet connection. The terminal servers connect to a local network interconnect (DELNI).

Terminal Servers connect numerous devices such as VT200-family video terminals and LNO3 and LA210 printers. Communications software that drives the server hardware resides and runs on the network's host system. Once logged on to an Ethernet host, users have access to Ethernet host applications, programs, and utilities as if they were linked directly.

Tying terminals and printers to a networked host system using terminal servers offers a wealth of benefits compared with the traditional method of connecting each and every device directly to a single host on the network with asynchronous cable.

Greater flexibility. Use of terminal servers reduces the cost and hassle of connecting large numbers of terminals and printers, and eliminates the distraction and clutter of excessive office cabling. By funneling communications activities from groups of terminals and printers into a single high-speed Ethernet channel, you can place your hardware according to your current functional needs.

With the log-in/load-balancing feature (ideal for VAXclusters), terminal servers allow a user to request connection to any of a predefined group of nodes directly connected to the Ethernet. The terminal server creates a session between the user and the node with the greatest available computing capacity.

Increased productivity. The terminal server can establish and maintain contact with several hosts simultaneously. You can move from session to session by typing a user-defined switch character, print out a lengthy report from a remote VAX system on a local printer, run a computer program on a second VAX system, and use a third VAX system to create and send electronic mail messages. All this—from a single workstation.

Terminal Server: DECserver

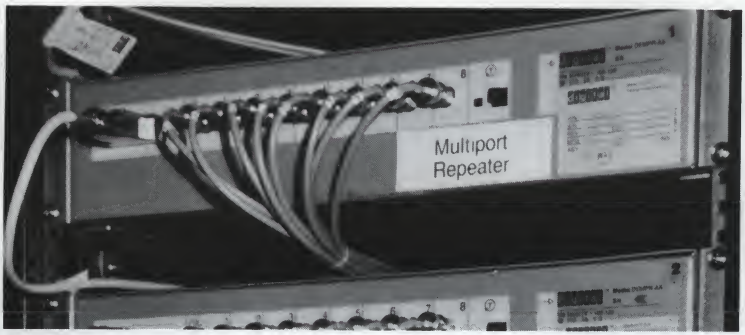
The ThinWire Ethernet Patch Panel

ThinWire cables that lead into the SER are permanently terminated at the back of the ThinWire Ethernet Patch Panel (TPP). The TPP makes it simple to reconfigure ThinWire connections as your network requirements change.

ThinWire Ethernet Multiport Repeater (DEMPR)

The ThinWire cables that require active network connections are patched through to a ThinWire Ethernet Multiport Repeater (DEMPR). Up to eight ThinWire Ethernet connections can be patched to a single multiport repeater. Each ThinWire segment can measure up to 185 meters in length. The Multiport Repeater retimes, amplifies, and repeats all signals received from stations on one coaxial cable segment and then passes the signal to the rest of the network.

The Multiport Repeater's auto segmentation/reconnection capability automatically identifies and isolates the ThinWire segments where the fault is located. It also automatically reconnects once the fault is resolved. This function protects nodes on other segments of the network and simplifies the network manager's troubleshooting tasks.



Multiport Repeater Linking ThinWire Segments

The Local Network Interconnect (DELNI)

The local network interconnect (DELNI) is an active concentrator with eight ports that can connect eight multiport repeaters or eight terminal servers or any combination of the two to the backbone Ethernet. These devices function as if they were directly connected to the standard Ethernet. You have the flexibility to adjust the network electronics connections in the SER to accommodate any present or future floor configurations.

The DELNI also serves as the interconnect device for stand-alone configurations. See Appendix A.

Ethernet Transceivers (H4000, H4005)

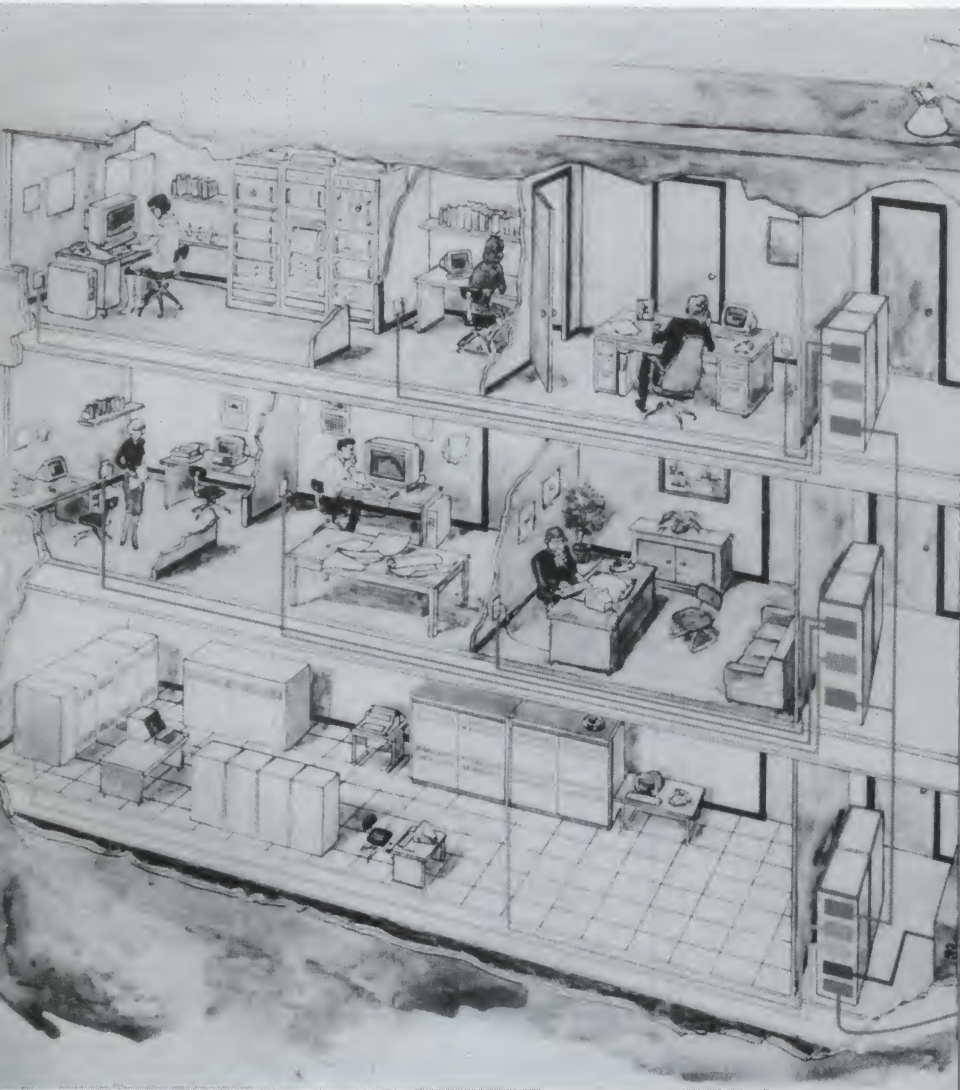
From the DELNI, a transceiver cable leads to an Ethernet transceiver that attaches to a standard Ethernet cable.

The transceiver cable is available in either PVC or plenum grade material in several lengths.

A transceiver sends signals, receives signals, and detects signal collisions on the standard Ethernet. The H4000 transceiver meets only Ethernet specifications; the H4005 transceiver is used when both Ethernet and IEEE 802.3 LAN specifications are needed. The H4005 transceiver is both smaller and easier to install.

Both transceivers use a nonintrusive tapping mechanism. Clamping onto the Ethernet coaxial cable without cutting it, these units can be installed,

repaired, or removed without interrupting network operation. You can reconfigure your network—make new connections, or change present ones—with ease.



Standard Ethernet coaxial cable is used to link floor configurations into building configurations. It is usally configured as a vertical backbone in a local area network.

▪ Standard Ethernet Coaxial Cable

Within a standard Ethernet local area network, the main transmission medium is the Standard Ethernet cable, which gives you 10-Mbps, high-speed LAN data communication throughput. It's a coaxial cable, 0.5 inches in diameter, whose rugged and rigid construction enhances its reliability.

Standard Ethernet coaxial cable comes in three section lengths. In a DECconnect System network, these cables can be joined using barrel connectors to create segments up to 300 meters (984 feet) long. And because it's Ethernet, there's little or no interruption of your applications. Figure 4.1 shows a building configuration.

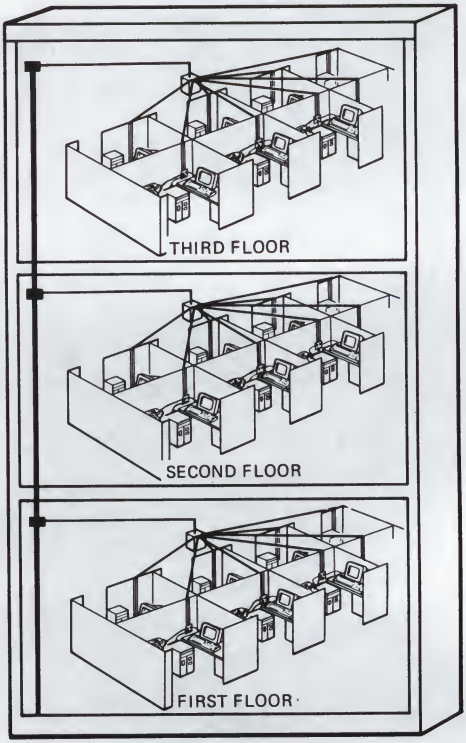


Figure 4-1 ▪ Building Configuration

▪ Connecting Hosts to the Network

To connect hosts to this standard Ethernet, Digital has Ethernet communications controllers (DEUNA, DELUA, DEQNA, DECNA) for UNIBUS, Q-bus, and Professional 300 Series systems. For systems other than these, a terminal server makes the host-to-Ethernet connection.

These communication controllers—made up of distribution panels, hardware module boards, and cables—reside on the host computer and connect to the Ethernet LAN via an Ethernet transceiver (Figure 4.2).

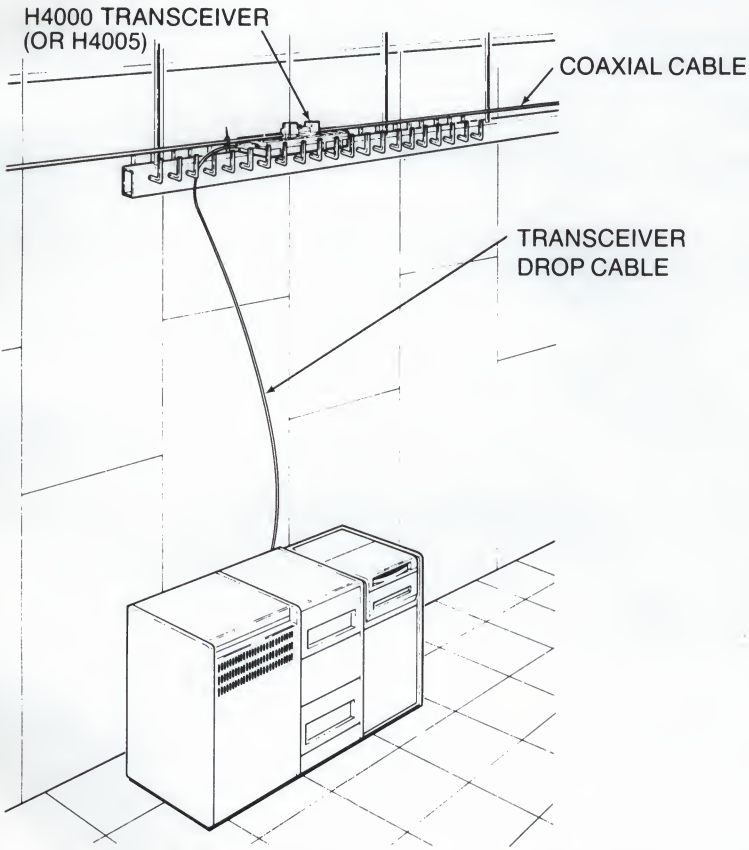
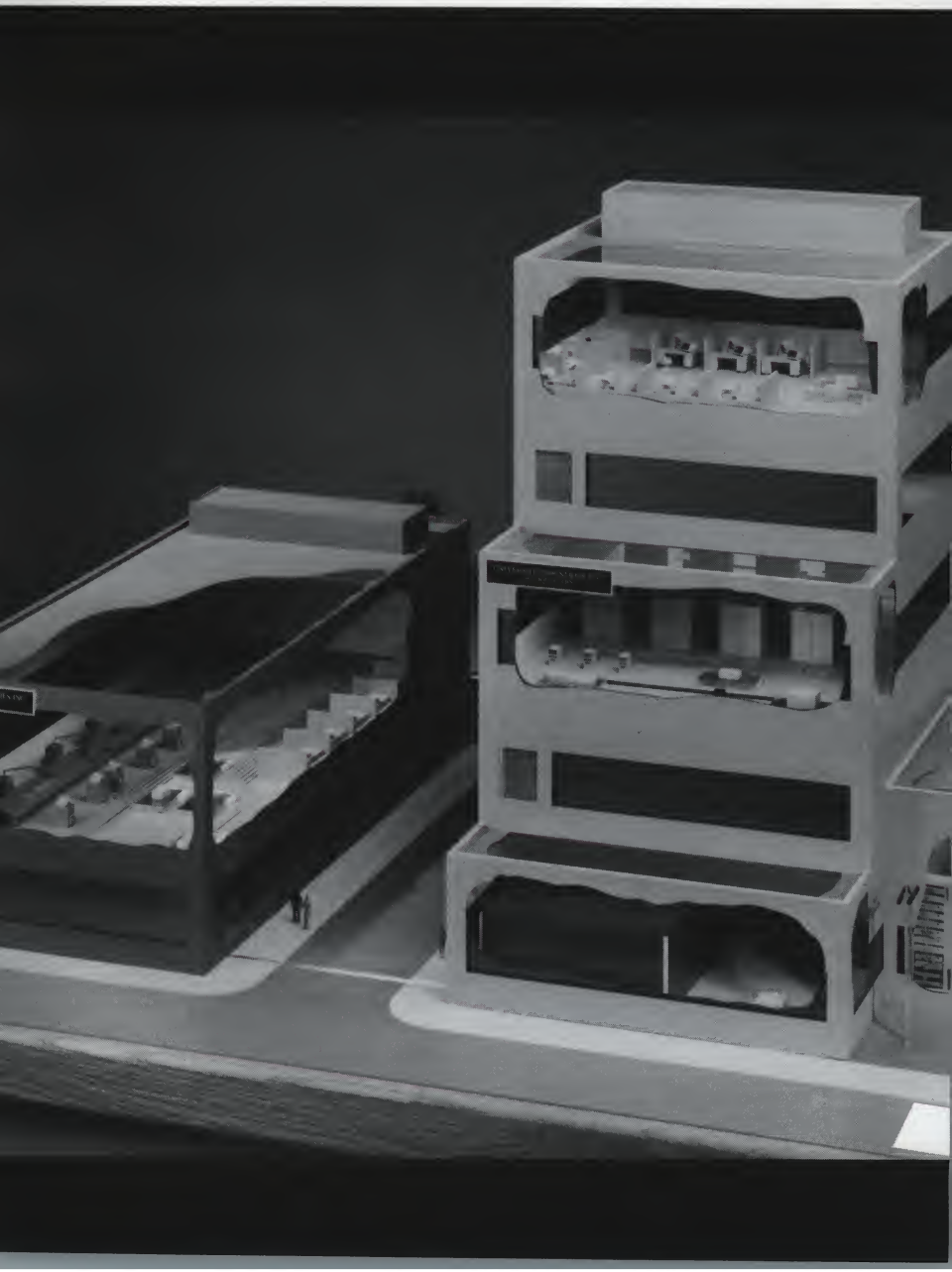


Figure 4-2 ▪ Host Computer Configured in an Ethernet Network



If your network has two or more standard Ethernet segments, bridges can be used to connect and expand your network configuration. Bridges provide network traffic management and security.

▪ Ethernet Bridges: LAN Bridge 100 (DEBET)

The LAN Bridge 100, in connecting two or more Ethernet LANs, creates an extended local area network. It extends the standard Ethernet LAN distance limitation of 2800 meters up to distances as great as 22,400 meters— with a maximum of seven bridges. Bridges connect both standard Ethernet and broadband Ethernet networks. The LAN Bridge 100 operates at the datalink level and provides high-speed 10-Mbps LAN performance that matches Digital's Ethernet LAN throughput speed. And, because it is protocol independent it provides multivendor compatibility.

Traffic management. To prevent two LAN segments from being overwhelmed by the combined traffic, the bridge controls network traffic. It creates a database of all the stations on the LAN and forwards only those messages that are destined for areas outside its local control. The *store and forward* function allows the bridge to store a message for transmission from one standard Ethernet LAN to another and to forward that message in synchronization with the local traffic on the other LAN. *Packet filtering* allows a bridge to discriminate between messages that should and should not be forwarded from one LAN to another, providing both network efficiency and security.

The bridge manages traffic automatically while still providing full network connectivity. A user can increase bandwidth efficiency by isolating traffic on heavily loaded segments from the rest of the network. Ideal for restricting traffic in such heavy usage areas as engineering CAD/CAM or finance departments from the rest of your corporate network, this dynamic management of data traffic flow improves network performance.

Optional management software. An optional host-installed management software package, the Remote Bridge Management Software (RBMS), can significantly enhance the LAN Bridge 100's operation. It allows a network manager at a VAX or MicroVAX host to observe and control any LAN Bridge 100 in the network. The manager can block traffic at selected bridges to isolate traffic on a segment of the network. The result is enhanced network security and control.

Local extension. When you need to extend LAN segments that are separated by fewer than 100 meters (328 feet), use the local version of the LAN Bridge 100 (DEBET-AA). It connects to standard Ethernet through a transceiver or a DELNI. Figure 5.1 illustrates a local connection.

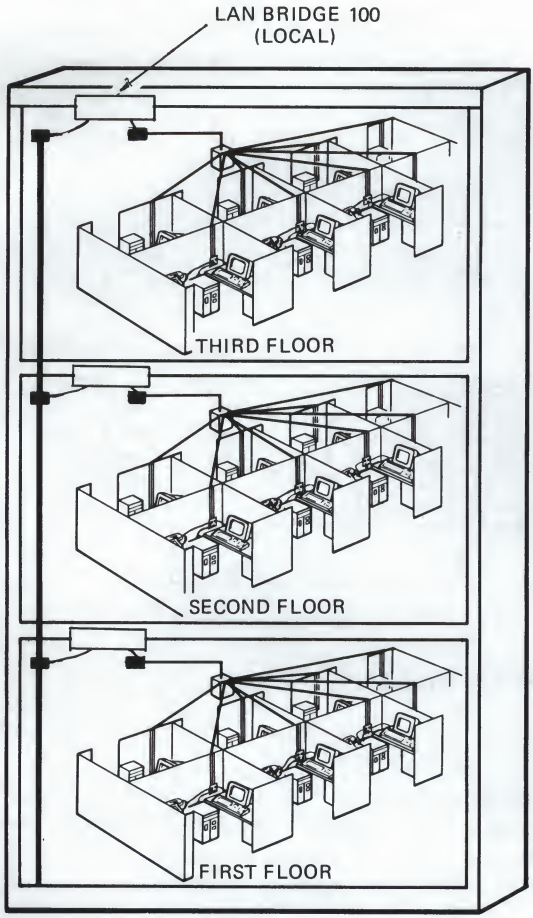


Figure 5-1 ▪ LAN Bridge 100 Linking LAN Segments

Remote extension. When the LANs between your buildings are separated by up to 2000 meters (7560 feet), as in a campus environment, use the remote version of the LAN Bridge 100 (DEBET-RC). Two remote bridges are used to connect the LANs via a transceiver cable and a fiber optic link (Figure 5.2).

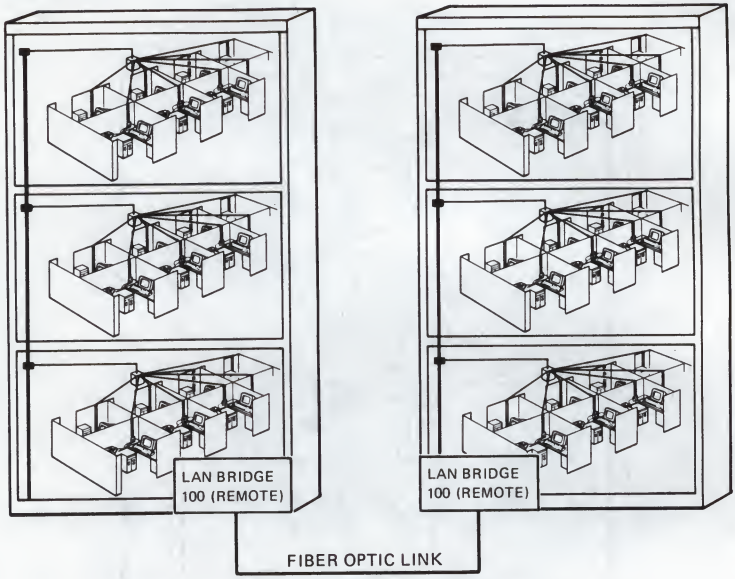


Figure 5-2 ▪ LAN Bridge 100 Linking Remote LANs

▪ The TransLAN Bridge

When your network spans distances over 2000 meters, you can use the TransLAN Bridge.

TransLAN can connect Ethernet LANs to either satellite or terrestrial digital transmission systems. On one side, TransLAN connects to an Ethernet LAN. On the other side, it can provide industry-standard V.35 or RS232 connections. These can then connect either to satellite earth stations or to private lines.

The TransLAN Bridge provides protocol-transparent interconnection. It serves as a link-level relay, transferring data independently of the higher-level protocols. The TransLAN does not restrict higher-level communications protocols. If dissimilar protocols are used, however, gateways are required for translation.

TransLAN delivers long-distance communication that resembles local communication. As a communications bridge for remote LANs, it can connect Digital stations running DECnet software, or non-Digital stations using homogeneous protocols.

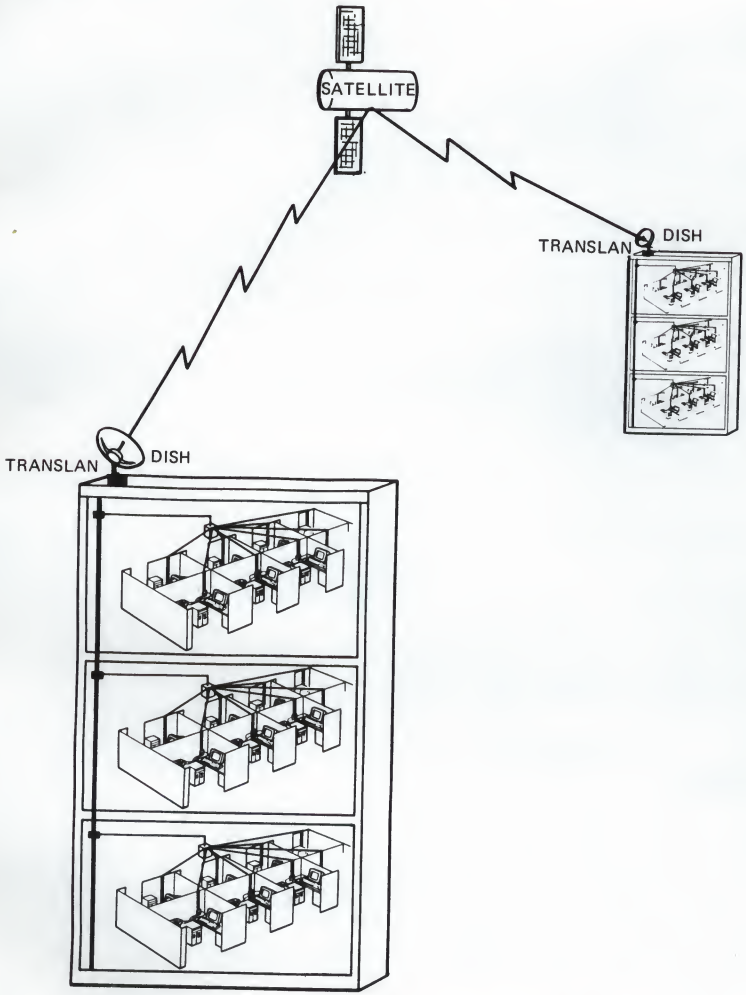


Figure 5-3 ▪ Network Configuration Using TransLAN Bridges

Your communication needs may extend beyond the local area network described in the previous chapters and you may have a mixture of various technologies. Your network may connect a public or private packet network, link your Digital network in one facility over a lease line to Digital networks in other facilities, or access an IBM Systems Network Architecture (SNA) network from your Digital DECnet environment. Figure 6.1 illustrates a wide area network configuration.

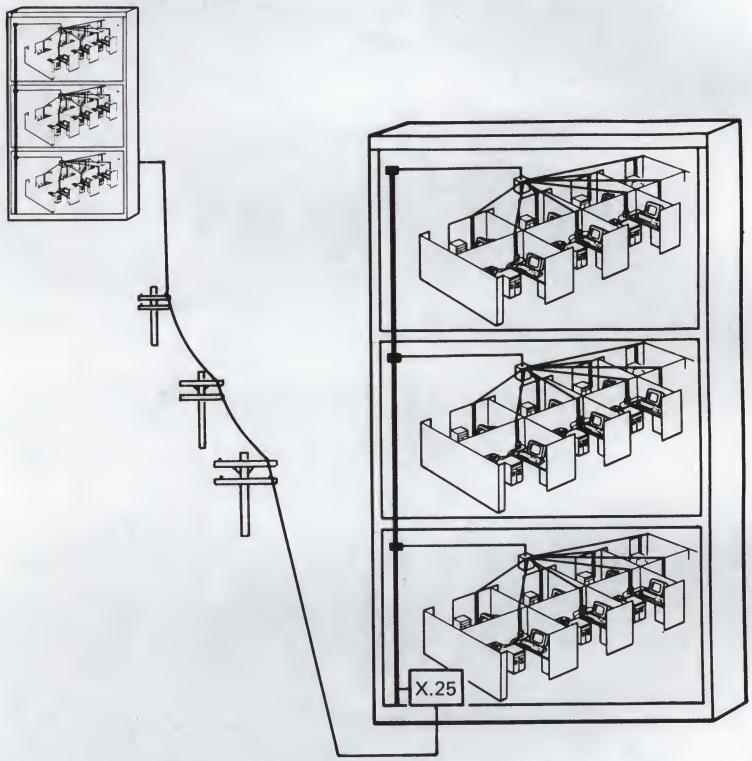


Figure 6-1 ▪ Wide Area Network Configuration

▪ The DECnet Router

When your network configuration includes connecting a DECnet Phase III or Phase IV local or remote host to Ethernet, or connecting two independent Ethernets, you should consider the DECnet Router.

The DECnet Router increases network efficiency and gives better overall performance for most larger networks. In addition it provides network management capabilities that help control the server, monitor its operations, and troubleshoot problems. These network management functions can be performed from any host node on the Ethernet, enabling you to organize your network management responsibilities more effectively.

▪ The DECnet/SNA Gateway

When you are planning networks which have both IBM's Systems Network Architecture (SNA) and Digital's DECnet products, you are confronted with the problem of providing bidirectional communication between the two networks. Your objective is to facilitate your users' transfer of data from one system to another in a transparent manner.

With the use of the DECnet/SNA Gateway, you can link the two vendors' computer networks together in a manner that goes beyond single-function data communications. You get the benefits of both Digital's and IBM's network environments.

The DECnet/SNA Gateway implements SNA protocols, letting you interactively access IBM applications from your Digital terminal, transfer data with Remote Job Entry (RJE), and provide program-to-program communications capabilities (3270DS, APPC LU6.2, and API). Also, IBM/SNA users can exchange documents with VMS, as well as interactively access VMS systems from their IBM 3270 terminal.

With the DISOSS (Distributed Office Support System) Document Exchange Facility (DDXF), users on VAX/VMS or MicroVMS systems can exchange documents transparently with IBM's office system, DISOSS. As a result, training costs are minimal and employees are immediately productive.

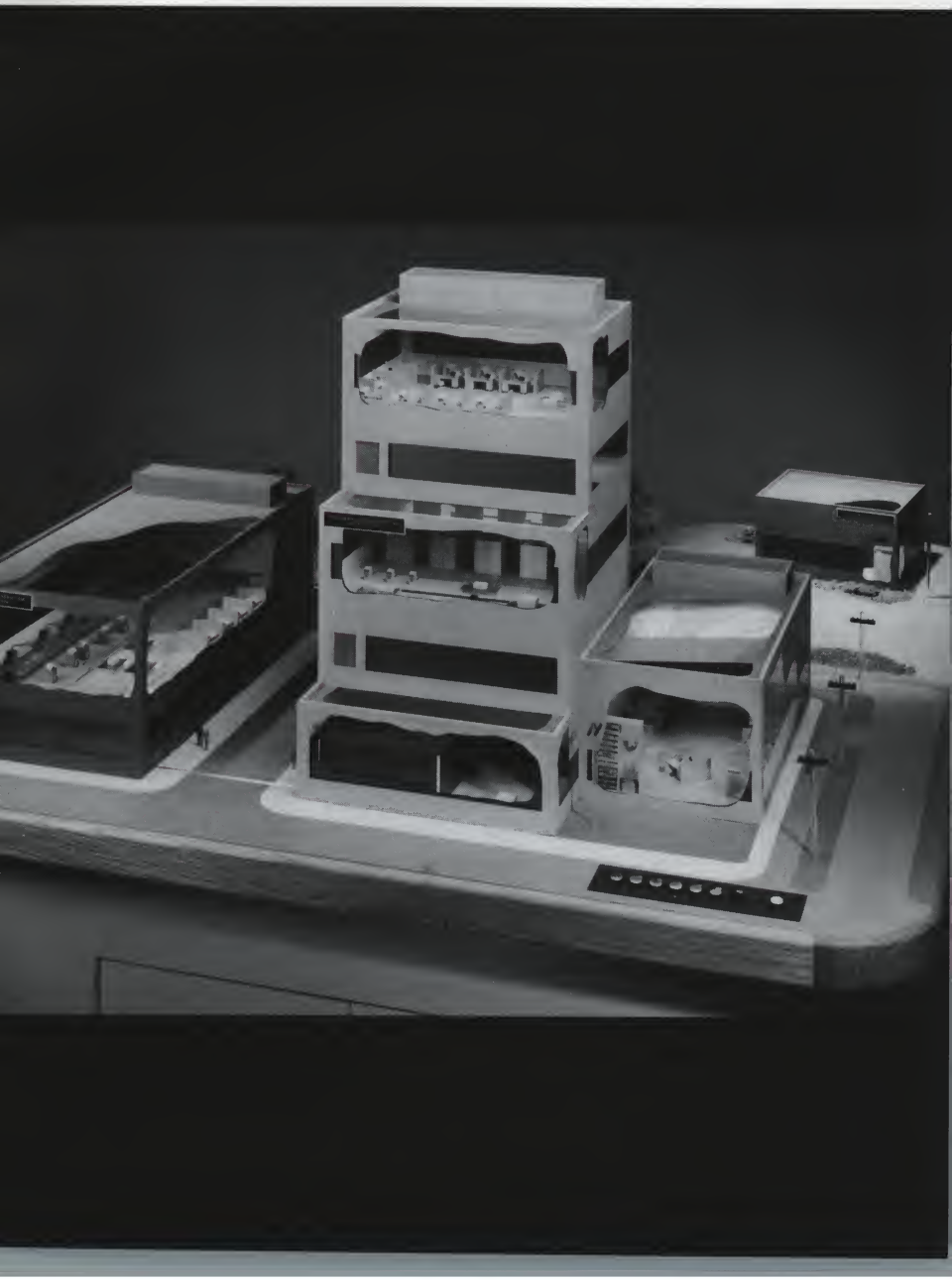
The DECnet/SNA Gateway allows you to protect your existing IBM SNA network investments. At the same time, it allows each network to grow independently of the others. This reduces your future network management costs. And Digital provides services to ensure that you have a successful installation and implementation.

▪ Packetnet System Interfaces (PSI) for X.25 Access

If your network includes a private or public packet-switching data network (PSDN), Digital's PSI products enable you to access both internal and external services available on these networks.

You can cover a worldwide geographic area without extensive capital investment through processor-to-processor or processor-to-terminal communication. As you pay only for what you use, network cost savings can be considerable. When you use the new MRX X.400 message router gateway product, your users have access to a world-wide electronic mail system no matter where your facilities are located across the globe.

Digital's PSI products support the new CCITT 1984 recommendations, including support for larger packet and window sizes, and the new ISO standards. They are therefore capable of providing as much throughput and flexibility in configuration as the PSDN concerned will allow. From a single terminal on a desk, users can have access to one or more certified public and local packetnets and to their numerous databases, information services, and similar facilities.



Digital's Standard Network Packages make it easy to take a building-block approach to networking. You can select a package for connecting terminals, PC/workstations, and departmental systems for a limited number of people working together in close proximity. Or with equal ease you can build a complete DECconnect Communications System that lets everyone in your company communicate across building complexes and multivendor sites.

The packages save you time and effort in configuring your network. You may be extending the number of offices, or adding a new floor section or a whole new building—in each case you can select the package or packages specific to configuring your additional terminals and systems into the expanding network.

The Standard Network Packages are meant to demystify networking. They are easy to understand, order, and install. You can use these packages singly or in combination to implement just about every possible networking configuration. And you get clear-cut service choices. Network package services (SERVpaks) provide simple, fixed-price planning, installation, and maintenance.

By packaging reliable hardware, software, and services, Digital's Standard Network Packages provide a complete set of connectivity alternatives.

Packages available are:

1. Low-speed Work Group Package
2. High-speed Work Group Package
3. Floor Package
4. Building or Site Package
5. Computer Room Package
6. SNA Gateway Package
7. Wide Area Gateway Package

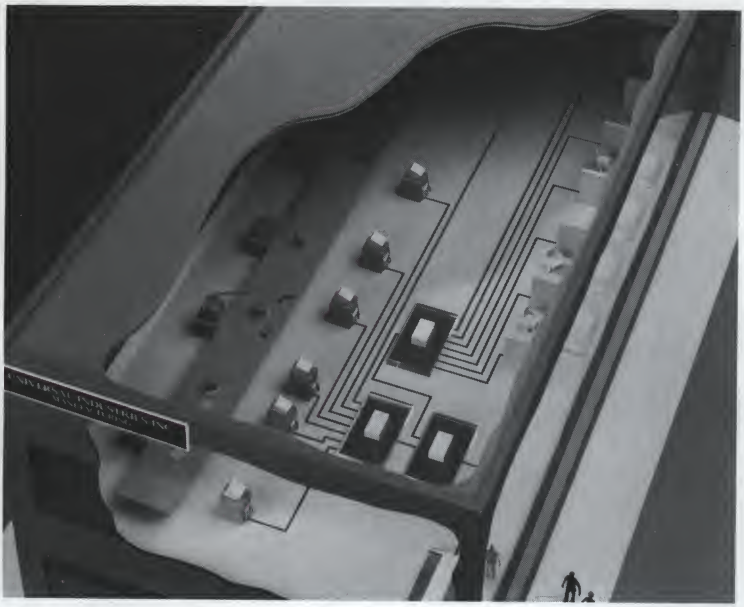
The following sections take a closer look at these packages and what they provide. CPUs and terminals are not part of these packages.

For in-depth information—with menu/worksheet tables that include preconfigured base hardware and software components and options—refer to Digital's *Standard Systems Catalog* or *the Networks and Communications Buyer's Guide*.

▪ Package 1. Work Group (Low-speed Communication)

The first Standard Network Package connects terminals or personal computers into a local area network.

The Work Group package can link 16 offices as a start. When used in conjunction with a Floor Package, it can be extended to serve a maximum of 64 users. The hardware consists of an Ethernet Transceiver, three Transceiver Cables, a DELNI local network interconnect, and two DECserver-100 Terminal Servers. You can use this package with any of Digital's standard systems or any CPU with a Digital Ethernet communication controller.



Work Group Package for Low-speed Communication used on a Factory Floor

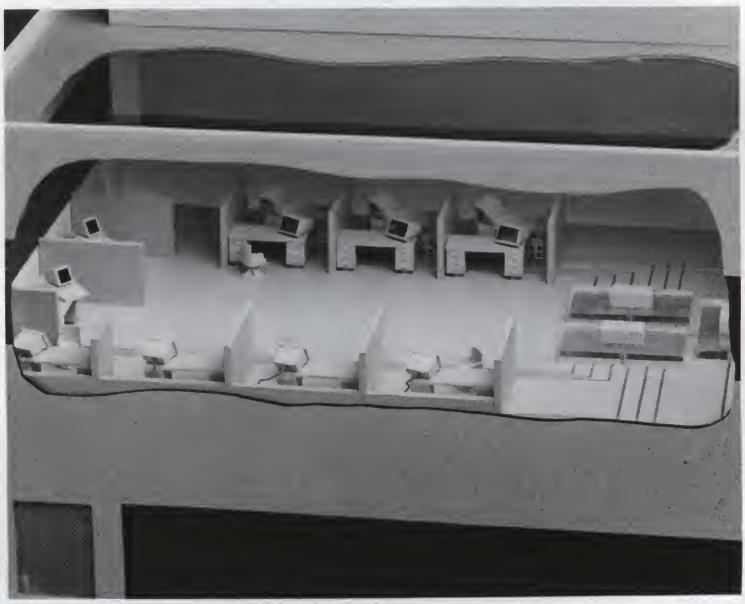
▪ Package 2. Work Group (High-speed Communication)

The High-speed Work Group Package links workstations and personal computers.

It uses 10-Mbps LAN ThinWire Ethernet cable to link 16 offices to begin with. Like the low-speed package, it can be extended to link 64 offices when used in conjunction with a Floor Package.

The hardware consists of an Ethernet Transceiver, three Transceiver Cables, a DELNI local network interconnect, and two multiport repeaters for connecting the ThinWire Ethernet cables to your personal computers or workstations. The host can be any CPU with Digital Ethernet communication controllers, or one of Digital's Standard Systems.

This package is usable with standard solutions and applications specified by Digital, such as: Office ALL-IN-1 mail applications and Integrated Laboratory Automation applications.



Work Group Package for High-speed Communication

▪ Package 3. Floor

The Floor Package lets you connect the Work Group Packages to a Satellite Equipment Room.

One SER will support up to 64 offices on a floor. With two SERs you can support over 120 offices on a floor.

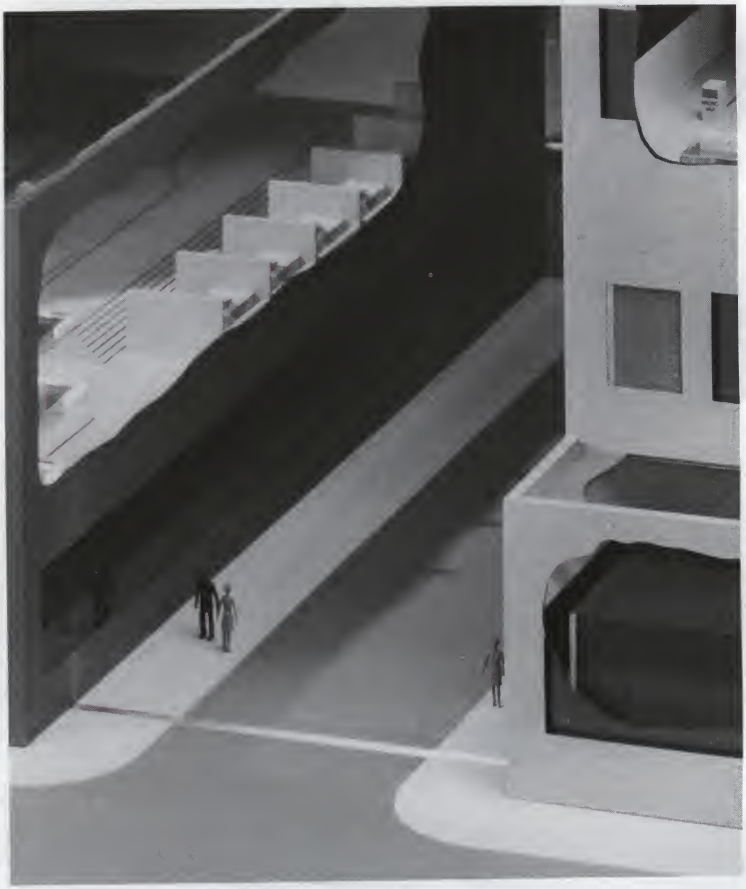
The Floor Package includes all the hardware components you'll need for a Satellite Equipment Room. It includes Ethernet Teflon coaxial cable and an Ethernet terminator. Also provided are the floor wiring and cabling you'll need to connect a second Satellite Equipment Room.

Floor Package

▪ Package 4. Building or Site

The Building Package links different floors of your building or different buildings within a site. The building package ensures that traffic on each floor is contained on the same floor, or traffic within each building is contained in the building.

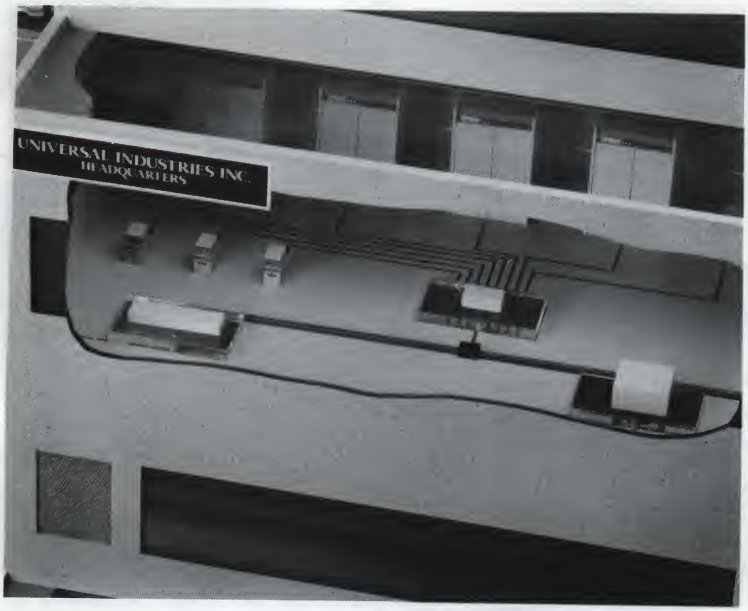
When connecting floors, you can use a local LAN Bridge 100 with a standard Ethernet coaxial cable backbone or you can use a remote LAN Bridge 100 with point-to-point fiber optic links.



Building Package

▪ Package 5. Computer Room

The Computer Room Package lets you connect up to eight systems within a computer room. Using Digital's Ethernet communication controllers, any CPU or standard system can be incorporated into this package. Hardware includes an Ethernet Transceiver, a DELNI local network interconnect, and nine Ethernet Transceiver Cables.



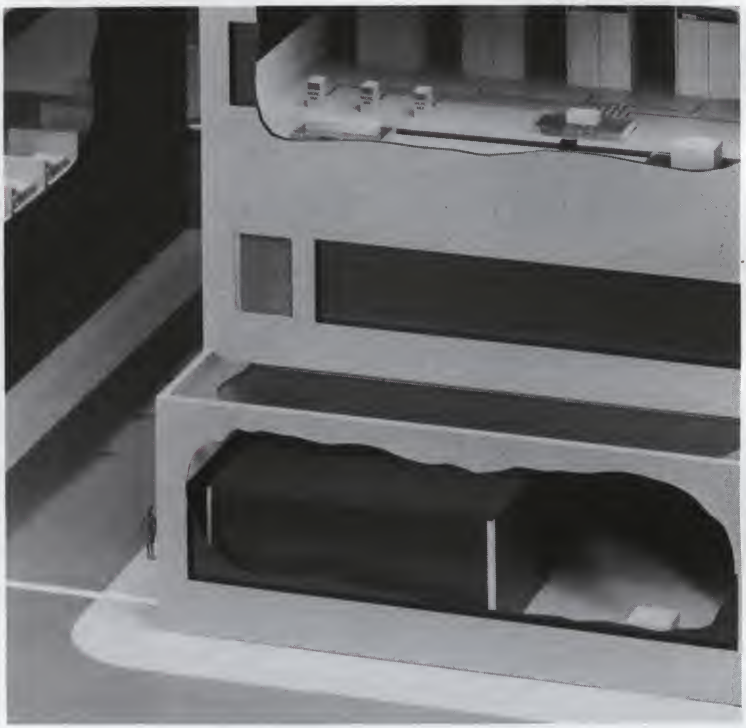
Computer Room Package

▪ Package 6. DECnet/SNA Gateway (IBM)

The DECnet/SNA Gateway package lets your Digital network communicate with an IBM SNA network.

IBM 3270 terminal users within an SNA environment can access your VAX system in a Digital network using one or more of nine access routines—Gateway Management, 3270 Terminal Emulation, Remote Job Entry (RJE), DISOSS Document Exchange (DDXF), Distributed Host Command Facility (DHCF), Printer Emulation, Advanced Program-to-Program Communication/LU6.2 Programming Interface, 3270 Data Stream Programming Interface, and Application Programming Interface.

The hardware for this package consists of an Ethernet Transceiver, Transceiver Cable, an Ethernet-based DECnet/SNA Gateway, and a U.S. Country Kit.



DECnet/SNA Gateway Package

▪ Package 7. Wide Area Gateway

The Wide Area Gateway option lets users, within a Digital network environment, access remote network users over an X.25 public data network (PSDN) or a DECnet private network.

As part of this package, Digital can provide you with individual site survey and installation plans to ensure proper cable routing and placement of electronics. Included hardware consists of an Ethernet Transceiver and a DECnet Router Server.

Wide Area Gateway Package

▪ Installation and Service Needs

Each Standard Network Package requires an installation service. Three levels of services are offered to help meet your requirements. They include installation of electronics and cabling, remedial DECservice for hardware components, remedial basic service for software, and full support of DECconnect wiring components. All SERVpaks have appropriate cables. A one-year warranty is also provided.

- SERVpak I is provided for existing office area installations where Satellite Equipment Rooms are not required. All cabling is open run and will be dressed and bundled. Suitable raceways and covers can be provided on request for an additional charge.
- SERVpak II is used to prewire user work areas in a new or unoccupied facility that will be installing Satellite Equipment Rooms and full DECconnect technology. Installation must occur during initial building construction or refitting of office space before occupancy.
- SERVpak III provides rewiring of work areas in existing facilities that will be installing Satellite Equipment Rooms and full DECconnect technology. Installation can be performed in occupied office areas and during nonbusiness hours for an additional charge.
- NETstart-Plus, as part of the Computer Room Service package, helps you organize network operations and plan for future growth.

When SERVpak services do not meet your needs because of unusual site conditions or network complexity, Digital offers a customized service approach to network planning, site survey, cabling design, and installation. See Chapter 8 for details.


GYW 640D

This chapter describes the comprehensive services available for a customized approach to support the DECconnect System and your networks in general.

Digital's Network Services offers a complete range of consulting, installation, and ongoing maintenance services available through our Network Specialists, Customer Services, and Computer Special Systems (CSS) groups. These services complement your inhouse expertise. They coordinate every phase of the life cycle of your network—planning, implementation, and operations.

In addition, Digital provides literature to help you every step of the way. Refer to the DECconnect System's *Requirements Evaluation Workbook*, *Planning and Configuration Guide*, the *Installation and Verification Guide*, and the *Networks and Communications Buyer's Guide*.

▪ Network Specialists

Digital's Network Specialists assist you through all stages of network development and purchase. They can put together a network profile that covers areas such as network topological design, traffic prediction, applications analysis, growth projections, and implementation schedule.

Network specialists can also help with the Customer Support Plan. This plan covers installation, startup, application development, training, network management, and troubleshooting. The plan also provides recommendations for supporting software and educational services. Later, Digital's Field Service and Software Support personnel install the hardware and software at each station and demonstrate working connections to all adjacent stations.

▪ Customer Services

Field Service, Educational Services, and Software Services are Digital's Customer Service organizations. Together they offer a comprehensive set of network services and tools that support the DECconnect Communications System.

Field Service Network Services

Digital is the single source of service for our own products. We also provide service for selected, major manufacturers' products in the networks market. Therefore, most networks, including those with non-Digital products, may be completely maintained under a standard Digital Service Agreement. Digital's professional service is also delivered on a worldwide basis, giving a consistent and high-quality response to international networking requirements.

Digital's Field Service Network Services include:

- Planning—Network physical design consulting.
- Implementation—Network physical installation management.
- DECsite Services—Complete site planning for computer systems.
- Operations—Ongoing maintenance.
- Network Tools—NMCC/DECnet Monitor, NMCC/VAX ETHERnim.

NETWORK PHYSICAL DESIGN CONSULTING

When planning and designing the physical layout of a network, you must take into consideration issues such as the type of building, type of occupancy, and local codes and restrictions. Digital's comprehensive Network Physical Design Consulting service makes sure that the physical layout design fully meets your application needs. It also forestalls potential problems during installation.

For instance, if you're designing a broadband network, our consultants can design the broadband cable plant topology, set design frequencies, determine component input and output levels, and prepare for future network expansion.

Site Survey Report. The Site Survey Report is prepared after our consultants survey your site looking for physical factors that can affect the cost or efficiency of installing your network. The report identifies all of the existing equipment to be connected to the network. It outlines any structural work required, such as aerial or underground cable runs.

Physical Layout Design. This design is developed from the Network Design and Site Survey Report. It includes working drawings showing proposed cable runs, location of all network equipment, cable plant frequency allocations for broadband, and calculated input/output levels at design frequencies of the cable components. You also get a cost estimate for the components used in the design. The Physical Layout Design is used to generate a comprehensive Installation Plan, with estimates you need to decide what to build, when, and why.

NETWORK PHYSICAL INSTALLATION MANAGEMENT

Working from the Network Design and Physical Layout Design, Digital's Field Service manages all of the installation activities. You receive smooth, timely, and well-coordinated network installation.

Network Installation Plan. In the end, your comprehensive installation plan includes complete design drawings and specifications for inhouse construction or outside bidding, schedules for each stage of implementation, and costs for the completed project. And, as your prime contractor, Digital manages and schedules all subcontractor activities for you.

Pre-installation Inspection. Inspection of the site before installation is conducted with the installer. All details of the required work are reviewed. Now Field Service is ready to prepare the final, detailed quotation for the installation.

Installation Inspections. During site preparation and installation, Field Service carries out both installation inspections and required interim testing. For broadband networks, the cable plant is certified as well.

Network Inspection. Upon completion of the installation of the equipment, Field Service carries out Network Acceptance Testing of the cable installation and associated communications equipment. Finally, in conjunction with Software Services, your entire network is functionally tested as a system.

Network Documentation. Field Service also supplies you with site documents. These include drawings of the installed network with cable routing and equipment location, and electrical test results. The documentation becomes part of the "Site Management Guide" for sites under Digital Service Agreements.

DECSITE SERVICES

DECsite Services are the professional help you need to prepare a site for the installation of the DECconnect System and all its related computer facilities. These services help you in the decision, design, and delivery phases of site preparation.

All necessary physical elements should be included in a project: space planning, power service, air conditioning, data communication wiring, Ethernet design and installation, fire security, access security, and equipment selection.

With three levels of service to choose from—DECsite I, II, and III—and five forms of agreement, you determine the extent of Digital's involvement and control of the financial and scheduling commitments for your project. Whatever the extent of Digital's involvement, it brings a professional understanding of cost effectiveness to all your computer site problems.

DECsite I. In DECsite I, the Decision phase, our professionals analyze your computer environment and data communication wiring needs in terms of operations, equipment complement, available space, building services, and future expansion. You'll get the engineering analysis and budget estimates you need to decide what to build, when, and why.

DECsite II. In DECsite II, the Design phase, Digital gives you detailed design drawings and specifications, suitable for inhouse construction or outside bidding. DECsite II provides two options—bid negotiation and construction phase consulting. As bid negotiation consultants, we assist you in evaluating bids. As construction phase consultants, we handle questions about the site design and deal with any changes. In short, we work with you to keep the project on track.

DECsite III. In DECsite III, the Delivery phase, Digital builds your computer site according to the DECsite II drawings and specifications. We'll complete the project to your satisfaction and warranty workmanship and materials for one year.

ONGOING REMEDIAL MAINTENANCE

Field Service provides the full range of onsite and offsite contractual services for your network and its associated communications equipment including Digital-qualified vendor products and broadband network interconnection ("backbone") cables. Baseband network interconnection cables (such as coaxial, fiber optic, or unshielded twisted-pair cables) will be repaired or replaced on a time-and-materials basis.

DECservice. DECservice is our most comprehensive onsite service product. With it you get fast committed response time, continuous service effort, extended hours coverage, preventive maintenance, installation of the latest engineering changes, and immediate attention to complex problems.

Basic Service. If you do not need the high level of DECservice, we offer the Basic Service Agreement. Basic Service is economical, yet gives you full service coverage. Your service calls receive priority second only to DECservice calls. You receive preventive maintenance, installation of the latest engineering changes, and immediate attention to complex problems.

Enhanced Broadband Cableplant Maintenance. This is Digital's most comprehensive onsite hardware maintenance service product for broadband cable systems, including all active and passive cable components. It is designed for customers who require maximum system performance. With annual recertification, this service keeps the cableplant in good operating condition.

Basic Broadband Cableplant Maintenance. This service consists of the same activities provided by the enhanced service, except that calls from customers with enhanced service receive priority response.

NETWORK MANAGEMENT CONTROL CENTER (NMCC)/DECNET MONITOR

The Network Management Control Center (NMCC)/DECnet Monitor is a set of sophisticated tools for observing and controlling complex networks. With these tools Digital supports you in managing your network throughout its life cycle. The DECnet Monitor is a layered product that runs on all VAX products. It can monitor all DECnet systems and any network with up to 100 stations. It collects data about the network, maintains a database of this information, and automatically purges old information.

NMCC/VAX ETHERNIM

NMCC/VAX ETHERnim is a network application program for monitoring Ethernet. It runs as a layered product on VMS and tests the Local Area Network (LAN) communications path using the Ethernet protocol and DECnet. NMCC/VAX ETHERnim has the ability to gather system information for its database from remote VMS and RSX stations by invoking test probes (remote command files). In addition, the program utilizes Phase IV DECnet software on a system configured as a DECnet Router.

NMCC/VAX ETHERnim:

- Enhances your Network Manager's ability to understand the status and condition of the host system's Ethernet.
- Detects changes and additions to the Ethernet configuration.
- Recognizes non-DECnet Ethernet addresses, allowing for low level path testing to non-Digital systems.
- Supplies a great deal of information about each station through an editable database.

Educational Services

The scope, variety, and quality of Digital's Educational Services is unmatched. One of the largest and most diverse computer education programs in the industry, it is available in the United States, Japan, Canada, Mexico, Europe, and Australia.

Digital's training includes a complete Network Training Curriculum with a full spectrum of courses and self-paced instruction to teach you the various skill levels required to run a successful and efficient network system. Our training meets the needs of both technical and non-technical personnel. Special programs are designed for the business manager, user, programmer, system/or network manager, network planner, and maintenance engineer. These training programs combine instructional design skills with a first-hand knowledge of Digital's products, so you can realize the benefits of your network.

Refer to the *Educational Services Digest* and the *Network Training Solutions Guide* for course listings.

Software Services

Software Services is a comprehensive set of Digital's network services that support your layered networking products, network management and operations, and customer-specific networking needs.

Network Planning and Design Service. This software service provides a network-based solution to your informational requirements. Our highly trained software specialists conduct interviews, gather and analyze network traffic and systems data, determine business and performance requirements, and assess network growth expectations. Based on this information, the specialists recommend a Digital network solution that meets your growth, performance, and cost expectations.

▪ Computer Special Systems (CSS)

And for your customized needs, Digital's Computer Special Systems (CSS) group offers design and manufacturing services for developing and supplying special function hardware, firmware, and software networking products. Typically, these services provide for:

- Digital to non-Digital host and terminal interconnect.
- Links to public and private networks.
- Network bridges.
- High-performance intelligent front-end communications processors.

In total, Digital's Network Services assure you that your network is well-planned, meets *your* specific needs, and maintains high performance.

Appendix A ▪ Configuration Guidelines

This appendix summarizes some configuration guidelines for the DECconnect Communications System. General guidelines tell you how to use Standard Ethernet coaxial cable, ThinWire Ethernet coaxial cable, fiber optic cable, DELNIs, DEMPRs, local and remote repeaters and bridges, and other network components. For full configuration rules, refer to the *DECconnect System Planning and Configuration Guide*.

This appendix, organized into four sections, discusses:

- Stand-alone systems using ThinWire, DEMPRs, and DELNIs.
- Connections to Standard Ethernet coaxial cable.
- Combined Standard/ThinWire Ethernet LANs.
- Extended LANs.

Configuration guidelines are given for the figures. Figure A-1 identifies the symbols used.

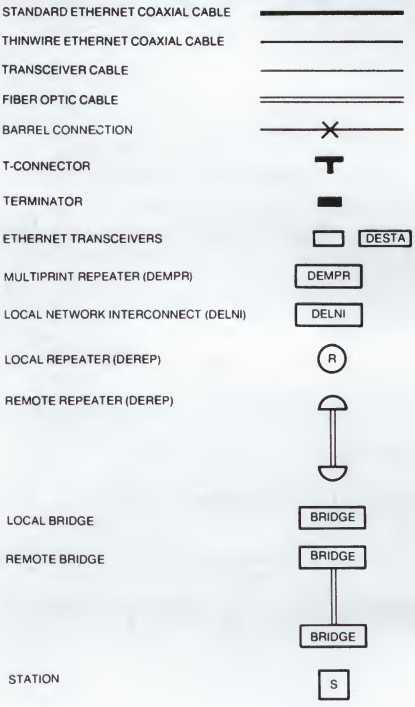


Figure A-1 ▪ DECconnect System Architectural Symbols

▪ Stand-alone Systems using ThinWire, DEMPRs, and DELNIs

The DECconnect Communications System supports work area configurations in situations in which faceplates and multinetwork access are not required. When necessary, they can be linked to a standard Ethernet LAN.

Stand-alone ThinWire Ethernet Configuration
Basic Configuration Guidelines:

- The cable can be up to 185 meters (606 feet) long.
- Stations attach to the cable using T-connectors. T-connectors plug directly into the station. (A station can be a PC, host, bridge, terminal server, router, or SNA Gateway.)
- There must be at least 0.5 meters (1.6 feet) between stations.
- There can be up to 30 stations on a cable with terminators plugged into the T-connectors on each end station. (See Figure A-2.)
- There can be up to 28 stations on a cable that is attached to a Satellite Equipment Room (SER). (See Figure A-3.)

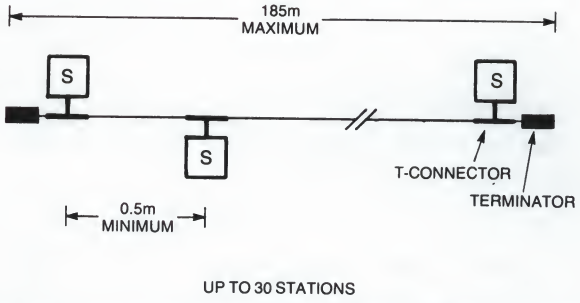


Figure A-2 ▪ ThinWire Ethernet Coaxial Cable with Two Terminators

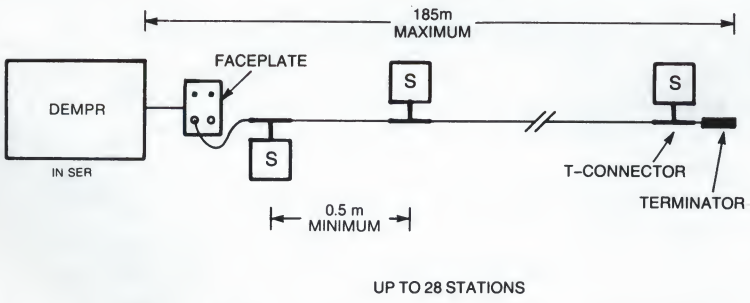


Figure A-3 ▪ A DEMPR ThinWire Ethernet Coaxial Cable Segment

Stand-alone DEMPR
Basic Configuration Guidelines:

- One to eight ThinWire cables can be attached to a DEMPR. (See Figure A-4.)
- Each cable can be up to 185 meters (606 feet) long.
- Stations attach to the cable using T-connectors. T-connectors plug directly into the station. (A station can be a PC, host, bridge, terminal server, router, or SNA Gateway.)
- There must be at least 0.5 meters (1.6 feet) between stations.
- There can be up to 29 stations per cable.

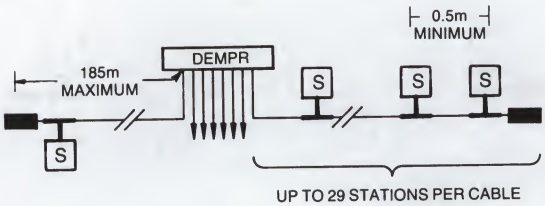


Figure A-4 ▪ Stand-alone DEMPR with ThinWire Cables

Stand-alone Cascading DEMPRs
Basic Configuration Guidelines:

- Cascading DEMPRs cannot be connected to a standard Ethernet LAN.
- There can be up to two DEMPRs between stations. Therefore, you can cascade DEMPRs on one of the ThinWire cables attached to a DEMPR. (See Figure A-5.) You must use a DELNI in order to cascade more DEMPRs. (See Figure A-6.)
- The ThinWire cable with the cascading DEMPRs can be up to 185 meters (606 feet) long.
- DEMPRs are connected to the ThinWire cable using DESTA transceivers. A DESTA is connected directly to the ThinWire with a T-connector and is connected to the DEMPR with 5 to 50 meters (16.5 to 165 feet) of transceiver cable.

- There can be up to 29 DESTAs (with their corresponding DEMPRs) on the cable.
- There must be at least 0.5 meters (1.6 feet) between DESTAs or stations.

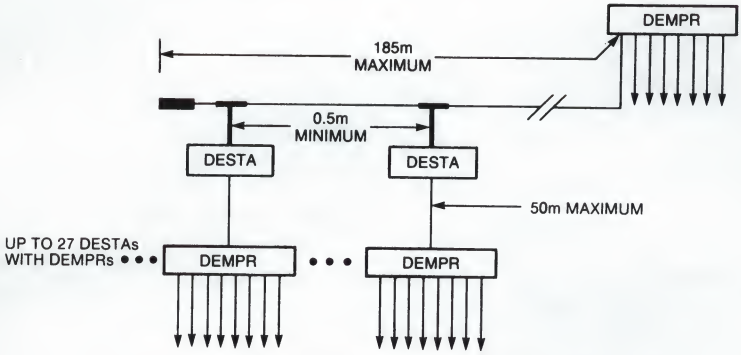


Figure A-5 ▪ Stand-alone Cascading DEMPRs

Stand-alone DELNI with DEMPRs
Basic Configuration Guidelines:

- Using a loopback connector on the DELNI, you can connect up to eight DEMPRs using 5 to 50 meters (16.5 to 165 feet) of transceiver cable for each DEMPR (Figure A-6).
- Because there can be only two DEMPRs between stations, you cannot have a cascading DEMPR on a DEMPR attached to a DELNI.
- Conventions for ThinWire cables connected to the DEMPRs are the same as those defined for a stand-alone DEMPR in the previous section.
- See section on connecting DELNI/DEMPRs to standard Ethernet.

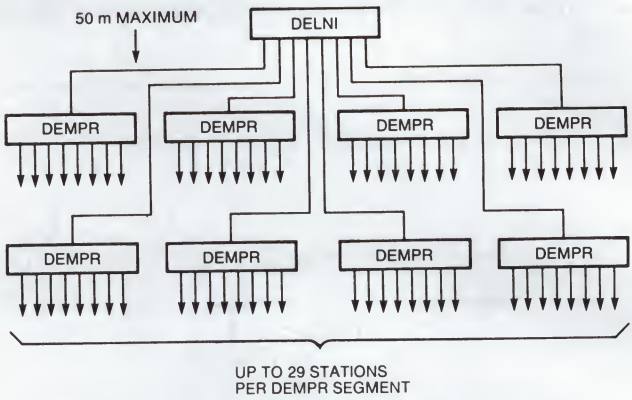


Figure A-6 ▪ Stand-alone DELNI with DEMPRs

Stand-alone DELNI

Basic Configuration Guidelines:

- You can attach up to eight stations to a DELNI using approximately 5 to 50 meters (16.5 to 165 feet) of transceiver cable for each station (Figure A-7). A station can be a PC, host, bridge, terminal server, router, or SNA Gateway. The maximum allowable length of cable depends on the station type. Refer to the *DECconnect System Planning and Configuration Guide* for full details.

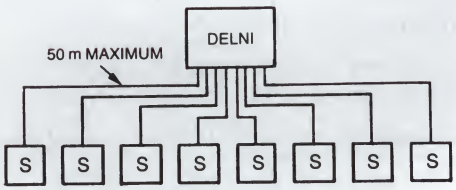


Figure A-7 ▪ Stand-alone DELNI

▪ Connections to Standard Ethernet Coaxial Cable

Standard Ethernet Coaxial Cable
Basic Configuration Guidelines:

- The cable can be up to 500 meters (1640 feet) long.
- Stations are attached to the cable using transceivers and approximately 5 to 50 meters (approximately 16.5 to 165 feet) of transceiver cable (Figure A-8). A station can be a PC, host, bridge, terminal server, router, or SNA Gateway. The maximum allowable length of cable depends on the station type. Refer to the *DECconnect System Planning and Configuration Guide* for full details.
- There must be at least 2.5 meters (8.2 feet) between stations.
- There can be up to 100 transceivers with stations on a cable.

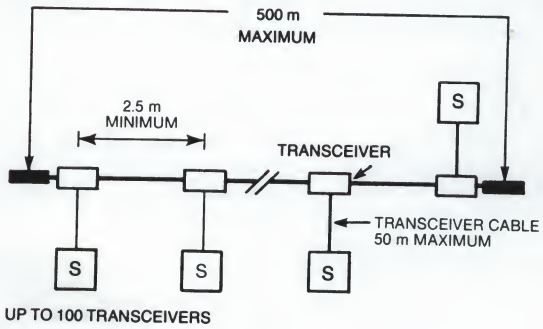


Figure A-8 ▪ Standard Ethernet Coaxial Cable

DELNIs on Standard Ethernet Coaxial Cable
Basic Configuration Rule:

- When a DELNI is installed between a transceiver and a station (see Figure A-9), the combined lengths of the transceiver cable between the transceiver and the DELNI and between the DELNI and the station must not exceed 45 meters (148 feet). (The DELNI consumes 5 meters of the usual cable allowance of 50 meters.) The maximum allowable length of transceiver cable depends on the station type. Refer to the *DECconnect System Planning and Configuration Guide* for full details.

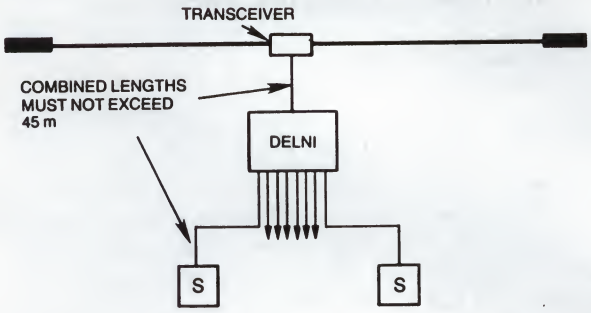


Figure A-9 ▪ DELNI on a Standard Ethernet Coaxial Cable

Local Repeater

Basic Configuration Guidelines:

- A local repeater (DEREP) amplifies the signal between two standard Ethernet coaxial cables by transmitting the signal over connecting transceiver cables (Figure A-10). Each transceiver cable can be 5 to 50 meters (16.5 to 165 feet) long.
- There can be up to two repeaters (DEREPs or DEMPRs) between stations.
- Repeaters have active standby capability. See the *DECconnect System Planning and Configuration Guide* for further details.

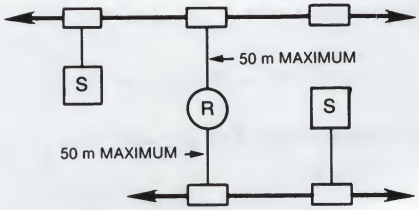


Figure A-10 ▪ Local Repeater

Remote Repeater
Basic Configuration Guidelines:

- A remote repeater (DEREP) amplifies the signal between two standard Ethernet coaxial cables by transmitting the signal over a combination of transceiver cables and fiber optic link (Figure A-11).
- There can be up to two repeaters between stations. The two halves of a remote repeater count together as one repeater.
- Each transceiver cable can be 5 to 50 meters (16.5 to 165 feet) long.
- The fiber optic link can be up to 1000 meters (3280 feet) between stations. Therefore, if two remote repeaters are used between stations, the two fiber optic links must share the 1000 meter (3280 foot) allowance.
  In order to calculate allowed network links, see the *DECconnect System Planning and Configuration Guide.*

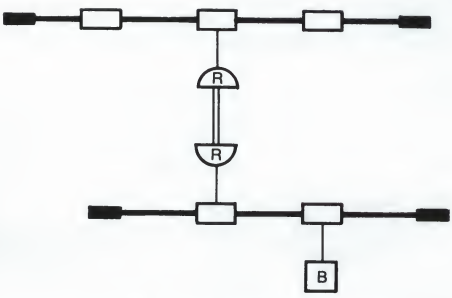


Figure A-11 ▪ Remote Repeater

▪ Combined Standard/ThinWire Ethernet LANs

DEMPR on a Standard Ethernet Coaxial Cable
Basic Configuration Guidelines:

- A DEMPR can be connected to a Standard Ethernet coaxial cable by a 5-to-50 meter (16.5-to-165 foot) transceiver cable and a transceiver (Figure A-12).

- One to eight ThinWire cables can be attached to the DEMPR.
- Configuration rules for ThinWire Ethernet coaxial cables and Standard Ethernet coaxial cables were described earlier.

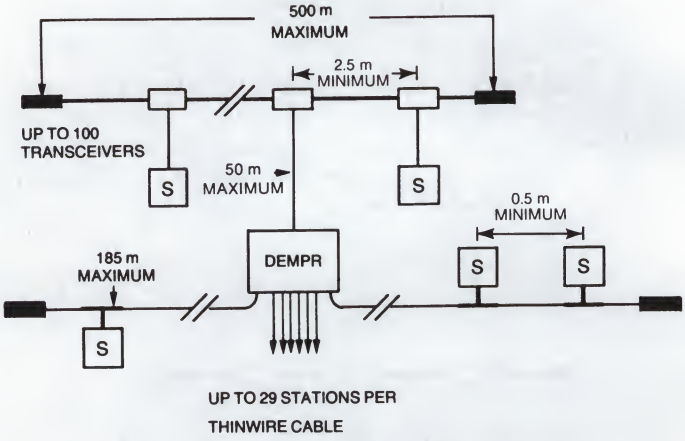


Figure A-12 ▪ DEMPR on a Standard Ethernet Coaxial Cable

DELNI/DEMPR Combination on a Standard Ethernet Coaxial Cable
Basic Configuration Guidelines:

- When a DELNI is installed between a transceiver and a DEMPR (Figure A-13), the Standard Ethernet cable segment to which it is attached must not exceed 300 meters (984 feet).
- When a DELNI is installed between a transceiver and a DEMPR, the combined lengths of the transceiver cable between the transceiver and the DELNI and between the DELNI and the DEMPR must not exceed 45 meters (145 feet). (The DELNI consumes 5 meters of the usual cable allowance of 50 meters.)
- When a DELNI is installed between a transceiver and a DEMPR, no DEREPs can be connected to the same segment.
- You can attach up to eight DEMPRs to a DELNI that is connected to a Standard Ethernet coaxial cable.
- Because there can be only two DEMPRs between stations, you cannot have a cascading DEMPR on a DEMPR attached to a DELNI.

- You can attach one to eight ThinWire cables to each DEMPR.
- Configuration rules for ThinWire Ethernet coaxial cables and Standard Ethernet coaxial cables are described in previous sections.

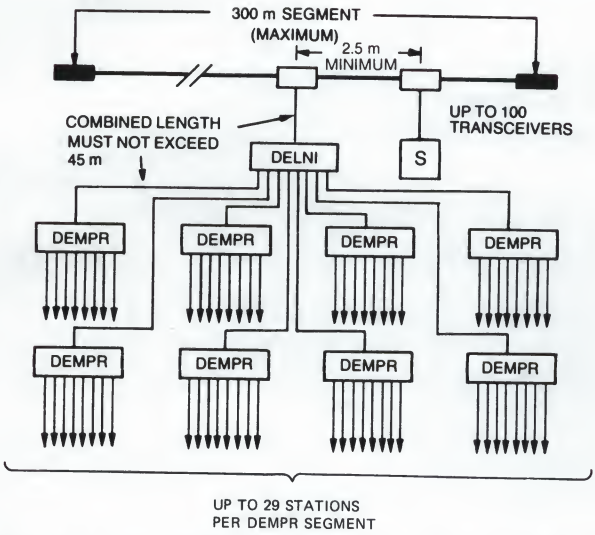


Figure A-13 ▪ DELNI/DEMPR Combination on a Standard Ethernet Coaxial Cable

▪ Extended LANs

Local Bridge (DEBET-AA)
Basic Configuration Guidelines:

- A local bridge joins two LANs by transmitting signals over connecting transceiver cables (Figure A-14). Each transceiver cable can be 5 to 50 meters (16.5 to 165 feet) long.
- There can be up to seven bridges between stations.
- Bridges have active standby capability. See the *DECconnect System Planning and Configuration Guide* for further details.

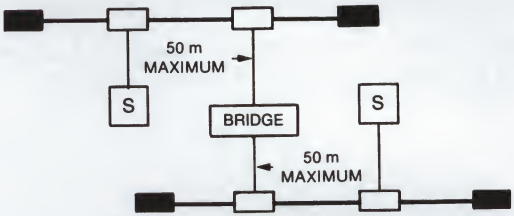


Figure A-14 ▪ Local Bridge

Remote Bridge (DEBET-RC)
Basic Configuration Guidelines:

- A remote bridge joins two LANs by transmitting signals over a combination of transceiver cables and fiber optic link (Figure A-15).
- Each transceiver cable can be 5 to 50 meters (16.5 to 165 feet) long.
- The fiber optic link can be up to 2000 meters (6560 feet) long.
- There can be up to seven bridges between stations. The two components of a remote bridge each count as one bridge. (Note that this rule differs from the rule for counting remote repeaters.)

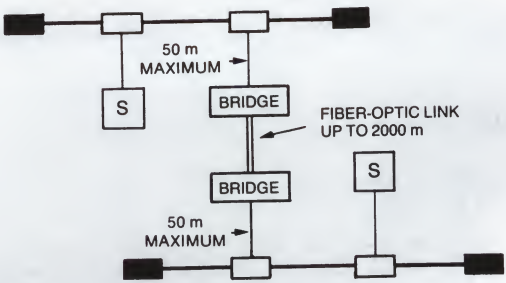


Figure A-15 ▪ Remote Bridge

Remote Bridge/Repeater Combination
Basic Configuration Guidelines:

- The remote bridge/repeater combination joins two LANs and amplifies the signal by transmitting it over a combination of transceiver cables and fiber optic link (Figure A-16).
- Each transceiver cable can be 5 to 50 meters (16.5 to 165 feet) long.
- There can be up to two repeaters between a station and a bridge. A repeater used in combination with a bridge (as in Figure A-16) counts as a single repeater, whereas two repeaters paired over a fiber optic link (see Figure A-11) count together as a single repeater.
- The maximum fiber optic link allowed from any station transmitting to a bridge from the repeater side of a bridge/repeater combination is 1500 meters (4920 feet). To calculate the allowed fiber optic link for bridges, repeaters, and bridge repeater pairs used in a specific configuration, see the *DECconnect System Planning and Configuration Guide.*

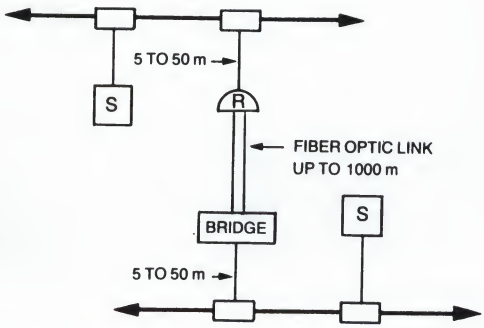


Figure A-16 ▪ Remote Bridge/Repeater Combination

Appendix B ▪ Guidelines for Satellite Equipment Room Design

▪ The Satellite Equipment Room (SER) Layout

The general room layout of the SER should conform to the following guidelines:

- The ceiling should be at least 2.5 meters (8 feet) high.
- The door should be capable of being locked and should be labeled with a sign, "Warning—Qualified Personnel Only".
- The floor should be linoleum, tile, sealed concrete, or a similar nonporous surface and should be suitable for the placement of lag bolts.
- SER rack assemblies should be mounted near the wall that is opposite the equipment room door.
- Adequate lighting should be provided in the room. Provide an emergency light that automatically turns on when power is lost to the building.
- The room should not be used for storage of any material or equipment not directly related to the cabling system. This applies especially to the storage of flammable material.

▪ SER Dimension Guidelines

The SER should be large enough to accommodate the SER rack assembly, the telephone patch area, the video patch area, and all necessary cabling. There are two equipment racks in every SER rack assembly: one rack holds the SER's active eqiupment, the other rack contains the SER's patch panels. The patch panels are used to establish up to 80 active connections in the SER. Each of the two racks has the following dimensions:

- Height: 223.4 cm (88 in)
- Width: 58.3 cm (23 in)
- Depth: 58.3 cm (23 in)
- Minimum clearance in front and on left side: 76.2 cm (30 in)

The SER should also be large enough to accommodate the telephone and video equipment. This area must be 76.2 cm (30 in) wide and should be located to the left of the SER rack assembly.

In addition, the minimum size recommended for the room is 1.65 m (65 in) deep, 2.44 m (96 in) wide.

▪ Environmental Conditions

The SER should have the necessary heating and cooling capabilities to maintain the following environment:

- Temperature: 10 to 40°C (50 to 104°F)
- Humidity: 10 to 90% (noncondensing)

The active equipment in the SER (not including any telephone or video equipment present) generates about 1300 watts (about 5000 BTUs). The room must be equipped with a forced-air ventilation system that has a 250 CFM capacity. The fan must be placed directly over the passive eqiupment rack. The inlet should be placed at floor level and must have an opening of at least 0.233 square meters (2.5 square feet).

▪ Power Requirements

The SER should have the following provisions for ac power:

- Voltage: 120 V ac (nominal)
- Frequency: 60 Hz
- Two dedicated (from a distribution panel) 15-amp power circuits each terminated with a NEMA 5-15R outlet. These outlets must be wihtin 0.61 meters (2 feet) of the rack's location. Both outlets must have an earth ground that conforms with the requirements in Appendix A. The racks are grounded through the outlet grounds; no further grounding is necessary.

In addition, there should be one 15-ampere duplex outlet (not on the equipment circuits) for the use of service personnel. This outlet should be within 91 cm (36 in) of the SER rack assembly.

Avoid locating the SER within 15.2 cm (6 in) of high-voltage power lines, fluorescent lighting, or any other possible source of electromagnetic interference (EMI).

Appendix C ▪ Documentation

For additional reference and for evaluation, planning, and installation purposes, use the following documenation:

Networks and Communications Buyer's Guide. Describes and gives ordering information for all of Digital's networking products. ED-28752-42.

The DECconnect System Requirements Evaluation Workbook. Describes how to determine specific network requirements. EK-DECSY-EG-001.

The DECconnect System Planning and Configuration Guide. Presents information to help plan a DECconnect System network. EK-DECSY-CG-001.

The DECconnect System Installation and Verification Guide. Gives information on how to install and verify a DECconnect System network. EK-DECSY-VG-001.

Glossary

Active converter. A device that converts one communication signaling standard to another. In the DECconnect System this means converting RS232 to DEC423. Active converters require separate ac power sources.

Backbone network. In an extended LAN, the network whose primary function is to forward network datagrams between the other networks in the extended LAN.

Barrel connector. A female connector for linking two sections of Ethernet coaxial cable.

Baseband network. A type of network that carries a single channel of communications signals.

Branch network. In an extended LAN, any network that is linked by a bridge to the backbone network or to another branch network. Every network except the backbone network is a branch network.

Branch segment. In a single Ethernet LAN, any segment that is linked by a repeater to the backbone segment. Branch segments carry datagrams to and from stations on the branch segment to the backbone segment.

Bridge. An active network device that is used to join two Ethernet LANs to create an extended LAN. The bridge is a specialized store-and-forward and packet filtering station that synchronizes traffic between LANs, and isolates local traffic. Also called *DEBET.*

Broadband network. A type of network that uses multiple carrier frequencies to transmit signals on a single cable.

Building. For the purposes of planning, a separate building entity. This can be a physical or logical distinction.

Cable concentrator. A device that converts several individual cables to a larger single cable without loss of signal information.

Cable patch panel (CPP). A panel, half of which is used to terminate cables coming from faceplates, and half of which is used to terminate cables coming from network or host connections. The connections are joined using patch cables.

CATV. Community Antenna Television

CCITT. The International Telegraph and Telephone Consultative Committee, the technical committee of the International Telecommunications Union (ITU), which is responsible for the development of recommendations regarding telecommunications, including data communications.

Coaxial cable. Two-conductor, concentric, constant impedance transmission cable.

Communications controller. A device within a host computer that allows communication with the LAN.

Computer room. Any room or area where several multiuser computers are located.

CPP. See *Cable Patch Panel.*

DEBET. See *Bridge.*

DECOM. A transceiver used with broadband Ethernet.

DELNI. A local network interconnect product that provides eight separate network interfaces from a single transceiver tap.

DEMPR. A multiport repeater that provides eight ThinWire Ethernet drops from a single standard Ethernet connection.

DEREP. See *Repeater.*

DESTA. A station adapter that acts as a ThinWire Ethernet transceiver.

Direct connection. A connection between a terminal and a host computer that does not use terminal servers and Ethernets. Direct connections use the RS232 or DEC423 interface.

Drop. The physical location of the end of an Ethernet transceiver cable.

Ethernet. A type of local area network based on Carrier Sense Multiple Access with Collision Detection (CSMA/CD).

Extended LAN. Two traditional Ethernet LANs joined together by a bridge. Bridges can be used to configure an extended LAN composed of up to eight traditional LANs.

Faceplate. A wall receptacle that provides the single network connection point for office communication equipment.

Facility equipment room. A room or wiring closet used to store extended networking components that link one building with another building. These products include remote bridges and remote repeaters as well as X.25 gateways and DECnet wide area network routers.

Fiber optic cable. Glass filament cable that transmits digital signals in the form of light.

H4000, H4005. Ethernet transceivers. See also *Transceiver.*

ISO. The International Standards Organization Reference Model for Open System Interconnection, ISO draft proposal DP7498. A proposed international standard for network architectures that defines a seven-layer model, specifying services and protocols for each layer.

Local area network (LAN). A privately owned communication network.

Local network interconnect. See *DELNI.*

Local repeater. A repeater that uses transceiver cables for both network connections.

Modified modular jack (MMJ). A jack used for connecting data cables to a faceplate.

Modular jack (MJ). A jack used for connecting voice cables to a faceplate.

Multiport repeater. A repeater that is used to connect more than two cable segments.

Multisegment LAN. A LAN that is composed of more than one coaxial cable segment.

Office cable. Six-conductor flat cable with a modified modular jack or a modular jack terminated at both ends.

Passive adapter. A device used to adapt one connector to another. Passive adapters do not require a separate ac power source.

PC. Personal computer.

Plenum grade. Cable that is UL-certified for installation without conduits in environmmental airspaces.

Port. The physical connector in an office drop that allows a connection to be made.

PVC. The standard coating used on cables. PVC is not UL-certified for installation in environmental airspace.

Remote repeater. A repeater that uses a transceiver cable for one network connection and fiber optic cable for the other network connection. Two remote repeaters are required to perform the repeater function.

Repeater. A device used to extend the length, topology, or interconnectivity of the physical network medium beyond the limits imposed by a single segment. Repeaters perform the basic actions of restoring signal amplitude, waveform, and timing applied to normal data and collision signals. Also called *DEREP.*

Router. A station that uses upper-level protocols to control network communication between other stations. A dedicated router, such as a DECnet router, offloads the host computer of the routing function.

Satellite Equipment Room (SER). A room or wiring closet used as the central wiring hub for up to 64 drops.

Section. A single length of Ethernet coaxial cable terminated at each end with a male end connector.

Segment. A length of coaxial cable made up of one or more cable sections connected together with barrel connectors or T-connectors.

SER. See *Satellite Equipment Room.*

Single-segment LAN. A LAN that is composed of only one coaxial cable segment.

Site. A physical location, usually a building or group of buildings, that represent a single entity for the purpose of network planning and installation.

Standard Ethernet. An IEEE 802.3 compliant Ethernet network composed of standard Ethernet cable as opposed to thin Ethernet cable.

Station. A single addressable device on a LAN.

Station adapter. An active device used to connect PC/workstations that have transceiver connectors to ThinWire Ethernet cable (see also *DESTA.*)

T-connectors. Connectors used to join ThinWire Ethernet cable sections. The connectors also have a connector that is attached directly to a station.

Terminal server. A device that controls communication between terminals and hosts, thus offloading hosts of this function.

Terminator. A special connector used on both ends of an Ethernet segment. This connector provides the 50-ohm termination resistance needed for the cable.

ThinWire. A Digital trademark used to describe its IEEE 802.3 compliant Ethernet products used for local distribution of data communication.

Transceiver. A device that provides a single physical connection between standard Ethernet and Ethernet communication equipment.

TransLAN. A bridge device that uses satellite or terrestrial link communications media to connect remote LANs, thus creating an extended LAN.

Twisted pair. Multiple-conductor cable whose component cables are paired together, twisted, and enclosed within a single jacket.

Unshielded cable. Cable without metal shielding around the conductors.

Wide area network. Two or more standard Ethernet LANs or extended LANs that are joined by the use of DECnet routers, gateways, or PSI software.

802.3. An IEEE standard describing the physical and data link layers of a local area network based on bus topology and DSMA/CD.

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The DECconnect Communications System Handbook

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